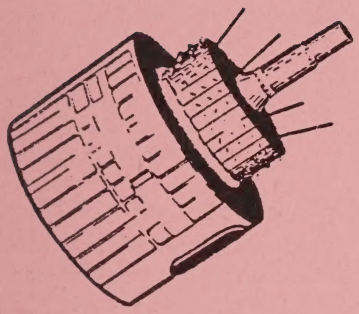
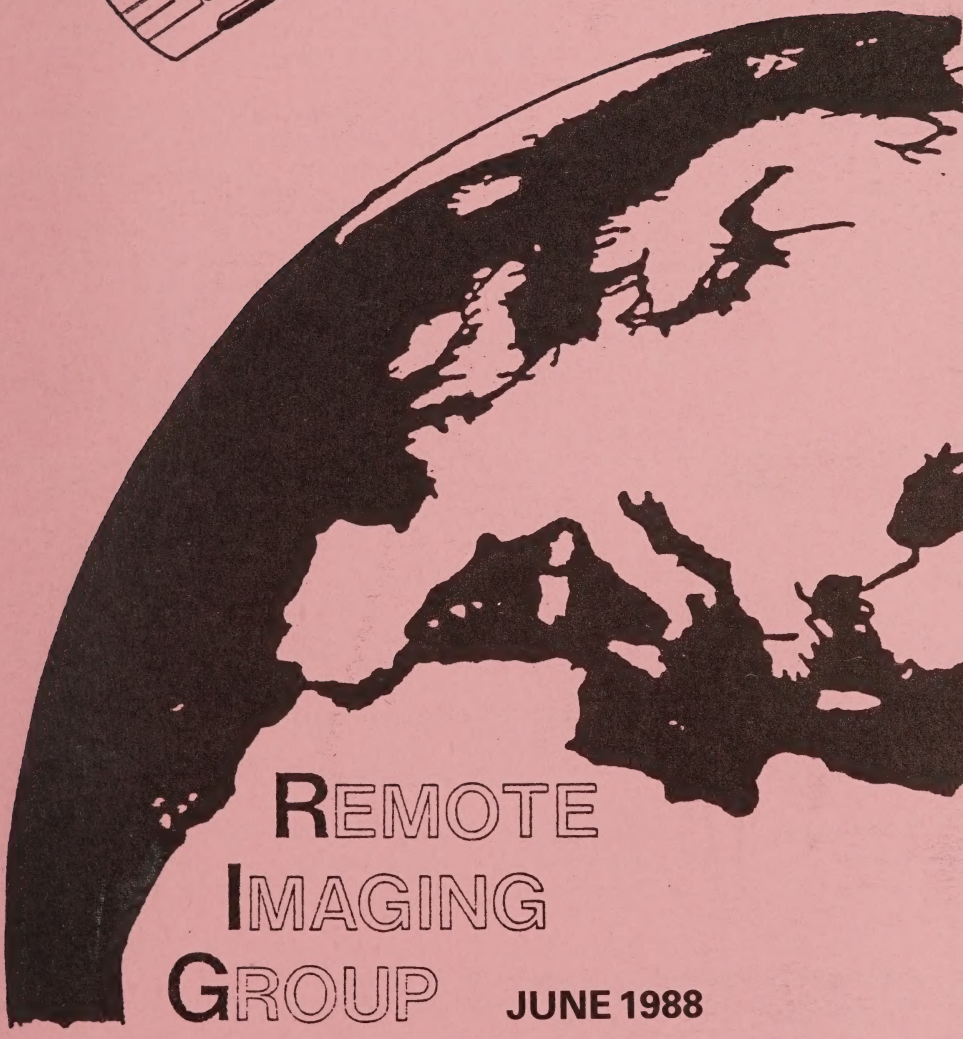
NEWSLETTER No. 13





REMOTE IMAGING GROUP

JUNE 1988

R E M O T E I M A G I N G G R O U P (R. I. G.)

N E W S L E T T E R No. 13 J U N 1 9 8 8

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Editorial and Secretaries page

I hope that you will all agree that this is our biggest issue yet, over 64 pages, due in the main to three major articles.

This month we have not one but two constructional articles for quad loop yagis for Meteosat reception. The first one to arrive was from Brandon Jones and the second from our chairman, Henry. I couldn't decide on which so have left the decision to to the reader on which to build!! The third article must surely rank as the definitive set of mods for the Rank Zerox Telecopier 400 from Adrian Nash. I've seen the system working and the results are very good.

On the subject of "whats happening up there" I've had reports, from Henry and from Bob Sansoni that there are problems with Meteosat2. Apparently the satellite was operating well outside its service life and has run out of hydrazine and is consequently drifting high. This should not affect us mere mortals which receive the Weefax signals but is causing the high resolution chaps problems. Effectively they are having to track this geostationary satellite to get adequate reception. I'm also told that ESA are planning to send up the 'spare satellite' as soon as possible, maybe even this month. This is unfortunate timing for ESA as I understand that the planned replacement for Meteosat which is of a new design was planned for later this year, but may now be delayed. I have no further information on the 'spare Met 2 launch' or the new generaton bird so would those who have please let me know.

Also the next NOAA satellite (NOAA 11 if it makes orbit) is also due up this month but has already incurred several delays.

On the subject of interference from paging systems, for those of you with a RIG receiver from Dartcom who are experiencing the problem fast forward to page 49.

Those interested in the workings of the committee, the minutes of the AGM are printed in this issue along with the accounts for last year (March - December).

Our membership renewals continue apace, total at time of writing is approaching the 1,000 mark but still some way off our yearend figure of nearly 1,150. I've received some results from Des, our membership secretary of the survey on the back of the renewal form. A large number of members use the mnow legendary YU3UMV framestore and over 350 members own a BBC machine. The number of Spectrum owners is approx 65 and an almost identical number have IBM PC's or clones. I plan to produce a more detailed report next time,

Phil, G8XTW

CHAIRMANS REPORT.

Welcome to the fourth year of the Remote Imaging Group.

After this years A.G.M. the old committee plus two new members, Ian Gurton and Mike Coombs were elected for another year's labour. At least we all enjoy the job and the fact that over 800 of you renewed your subscription so quickly was a real vote of confidence in us all. I only hope we can continue the good work. There are so many things to do and we always seem to go from one panic to another, but we always manage with everyone mucking in together. Together is the keyword as the team really are great in the way they pull together, there is still room for more members on the committee so that we might have more skills available to serve you, our members.

The results of the tests on the Quad Loop Yagi didn't come through in time for the last Newsletter, but they were worth waiting for and are given in an article later on in this one, together with another article that has been sent in by Brandon Jones, I won't comment further as I am bound to be biased. I am told that there is a similar design in VHF. Communications this quarter, but as my subscription hasn't reached them yet, I am still waiting to see if there are many differences. The figures lived up to my own expectations and will probably be of interest to those of you who cannot, for some reason or other erect a dish but can get away with something more discreet. I hope this will meet with your approval and if you cannot build one yourselves, perhaps then a ready built model will do nicely! Time will tell as they say!

Dartcom have come up with some modifications for those of you with problems with the new national paging systems. I am told that it all still goes onto the same board and is quite a simple job to do oneself, hence saving all that postage and insurance if you had to return the unit to Devon. It reduces the skirt response to 65db and should get many of you out of trouble. This modification will be incorporated in all future units. Those of you who have had this modification done or done for them and still have problems can contact Dave Wright as there is a further modification which takes the skirt response down further to 85db. Lets hope that these modifications remove the problem for most of you, the remainder, well we shall have to see what can be done, at least we should be getting down to considerably fewer numbers, allowing us to concentrate on the special problems that are bound to occur. Unfortunately other manufacturers and designers have not come forward so far with mods for their own products.

As usual Henry has not done a lot of work in the shack just lately, he hasn't done anything further on the optical shutter, hasn't boxed his frame store or receiver.

He has been busy with his end of year returns, P11D's, P60's or whatever - just another of the pleasures of being self-employed! I have done some work work but a lot of time has been taken up getting an IBM computer going, well others peoples time, it arrived as a kit of parts but working at that. Well thats not quite true, most of it was working, my main problem has been with the 20 megabyte hard disk drive which just kept forgetting, after a great deal of time and head scratching, a program which checked it all out was used. It rejected all the bad clusters and moved all the currently used dodgy clusters to a safe location. I am currently collecting programs that are likely to be of use, but I can already see that the possibilities are almost endless well, until I have outgrown this machine! All I need now is a colour monitor, an onboard clock and a printer, any offers? Although I have had the use of someone else's machine in the past, for which I am very grateful, I can now do this on my very own equipment and actually type in the chairman's report whenever the inspiration comes - if the machine is still working!

My thanks to Dermot, Phil, Robin and Chris who have had the courage to put up with me over these past few weeks. I still don't know if this will mean bigger and better chairman's reports, probably more boring! In fact I was wondering if we should change the title to chairman's waffle? No doubt you will let me know! At the Sandown rally I was pleased to be able to have a good look at the new Martelec 512 X 512 framestore display. I must also say that the results were not as good as I was expecting, but most of the problems were with the monitor being a colour one, viewed in daylight, not the best set of circumstances. I am certain that we shall be seeing more of this design in the future.

As you can see from the accounts given later in this newsletter we have made a small surplus in the finances for the past year, we don't anticipate an increase in next year's subscription, but we cannot forecast any increase in costs to the group beyond our control such as postage or printing. The most important thing is that we are here and doing our best for you.

Three of our members now have high resolution system working, we all look forward to seeing the results. It could be possible that any of you with an IBM controlled framestore and using a 5.25in. disk containing the raw data, might be able to display the same. Time will tell as they say.

I am told that we are getting noticed and talked about elsewhere in the world, and that the results that we are getting in this country are equal to or better than those of more technologically advanced countries. Keep up the good work! Now that the raw data is becoming available to some of you and with the availability of even more sophisticated number crunchers and ancillary equipment,

I expect to see some pretty substantial developments in our field in the next few years. Remember the professionals do not always get it right, we might have to show them the way forward. Keep the experiments going, you never know what the results will be!

As some of you might know, there is going to be a satellite users conference in the USA in the next few weeks. This time one of our committee members Colin Hall will be there and representing us. I hasten to add that we are not paying for everything but we are supporting Colin in a small way. He is giving a paper and we look forward to getting a report and no doubt an article in a future newsletter.

Can you remember me asking for help with the rally organiser job? Well we seem to have filled this vacancy but created another problem! Peter has said that he will do the job but would like to give up the treasurer's job, just after we had filled that spot, we now need a treasurer. We shall have to see if we get any offers at the next committee meeting. But just in case the post hasn't been filled and you feel that you would like the job then have a word with the secretary.

After being QRT for quite some considerable time, I have recently applied volts to the Dartcom receiver. For several days now it has been giving out those wailing sounds very regularly. I don't suppose that it will long before there is something connected to the end of it. I've warned everybody else that it's addictive so no doubt I shall succumb before too long, the trouble is that I wonder if I've become immune, but I doubt it.

Well that just about it for this session. I still have the article on the Quad Loop Yagi to finish, so I will disappear to another file and wish you all G'day

Henry.

TABLE OF DIMENSIONS FOR RING YAGI ON PAGE 6:

Element:	Element length:
Ring reflector	7.2 inches (over size 0.1 in.)
Main Element	6.85 inches (exact size)
All Directors	6.2 inches (over size 0.1 in.)
Rectangular secondary Reflector	4.2 inches by 3.45 inches
	Hole 0.6 inches from bottom in centre.

RING YAGI FOR METEOSAT.
by Brandon Jones, G4ISQ.

This is a simple design for a quad style ring Yagi for Meteosat at 1700 Mhz, the cost per aerial being approximately 8 pounds. The aerial consists of a boom made out of 15mm copper tube bought from a Do It All store as supplied for central heating systems. 3 meters of this costs as little as #3.29. The rings were cut from a sheet of 24 gauge of brass 10 inches square which cost me 3 pounds. The only other assembly components being 35 off 1 inch 8 ba steel screws at 2 pence each, some solder and 12 inches of 50 ohm co-ax cable.

Mark a line at 6.2 inches from one edge down the length of the brass sheet, then using sheers cut this 6.2 inch strip off. From this sheet all of the directors all 6.2 inches long were cut one by one 3/16 inches in width. If they were cut with sheers they form in a circle so helping to attain the ring shape. Next cut the main element same width to 6.85 inches long and finally the ring refelector to 7.3 inches. In the centre of all the strips drill an 8ba clearance hole for the mounting bolt. In the end of the main element as close to the edge as possible drill 1/8 inch hole at the other end of the strip a 1mm hole again close to the edge. All of the rings have to be formed by hand as close to a circle as possible except for the main element. The balun length is smaller than the diameter of the circle formed by the main element, so the element has to be made elipsoidal.

The most important parameters with this aerial as far as dimensional accuracy are, the size of the main element and the balun. By getting these only fractional wrong can make the difference between all signal received and none at all. The first ring reflector and the first ten directors are critical but these can be ajusted on test with a soldering iron. It is possible also to critically ajust the balun length if you wish to experiment by altering the soldering point at the contact point of the ring spacer spacing the element from the boom.

The boom must be marked out first of all with a line down its length, then the drilling points of all of the elements. This should be done preferably with an accurate measuring device such as a vernier caliper. I drilled the boom with an 8 ba core drill for tapping, then using the bolts as self tapping screws screwed them into the soft copper of the boom. A 4 ba nut was used as a spacer under the main element and when all of the elements had been fitted.

I soldered with the aid of a small gas torch all of the elements including the spacer to the boom. finally it was necessary to cut off the bolts and file them down smooth against the boom. The end of the boom at the secondary reflector end was plugged with a large brass nut with the points of the hexagon filed down so that it fitted into the boom tubing. This was then soldered into the boom and a bolt found to fit it. Now solder the tops of the rings together with a 0.1 inch overlap. Finally it is only necessary to cut off the excess boom and drill the hole for the coax to pass through the boom out to the connector. If the balun and coax is prepared as as in the diagram then after feeding it through the boom pass the core through the 1/8 inch hole in the element. Solder the core centre wire into the 1mm hole in the other end of the element as in the the diagram. Next with care solder the tip of the sheath to the element around the 1/8 hole. It is helpful to fit under the element holding bolt an 8 ba solder tag for ease of soldering to the balun. Solder the balun to this point.

Purists here will scream when I say that I used UR43 coax for the connection and balun, but it appeared to work OK. Ideally coax such as RG402U or RG405U should have been used here,but where do you buy it from and can you afford the price of 8 pounds per meter, plus the price of the TNC or similar connectors required to connect it to your apparatus.

Final tuning was done on the Meteosat signal itself by carefully ajusting the overlap of the soldered joints on the top of the rings of the reflector ring and the directors one by one so widening or narrowing the ring diameter. The ring sizes except the main element have been given as a tenth of an inch too big to allow for this.

One of these antenna in conjunction with LMW converter, a Time step receiver and a YU3 UMV display gave noisy but usable pictures. Two of these antennas gave acceptable pictures, so I have concluded from this that a pre-amp is necessary for the final 3 to 6 db required to bring the picture quality up to scratch. This I am at present in the process of design and construction using the cheap Maplin Gasfet that is available in their catalogue. The most pleasing aspect of this antenna was the ease at which I hid it away out of sight on my shack roof. No matter where you stick a 3 or 4 foot dish you can see it for miles away because it is just surface area. Suitably painted for camouflage this antenna even though it ended up at least seven feet long, just disappeared out of sight.

Even though I used copper and brass for this aerial I see no reason why it should be made out of other materials such as aluminium though it is still more convenient to use brass of copper for the main element.

TALE OF SPACING

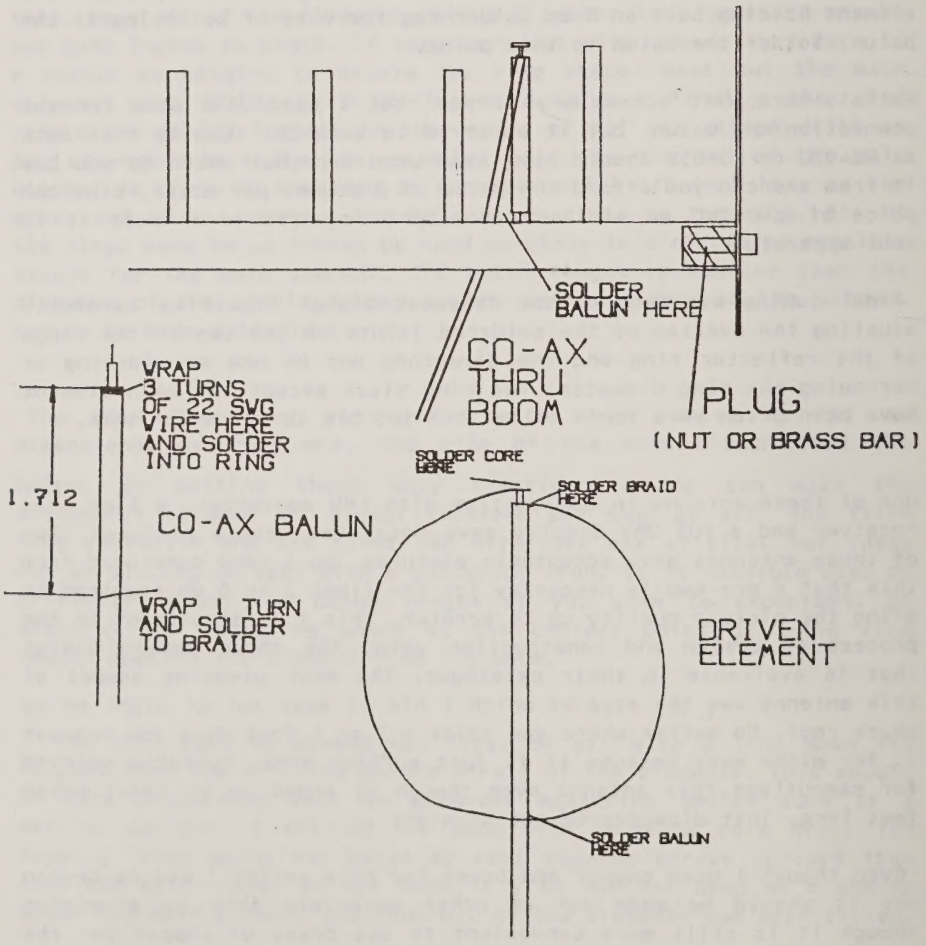
Rectangular reflector to secondary reflector 2.37 inches

Ring Reflector to main element, 0.726 inches

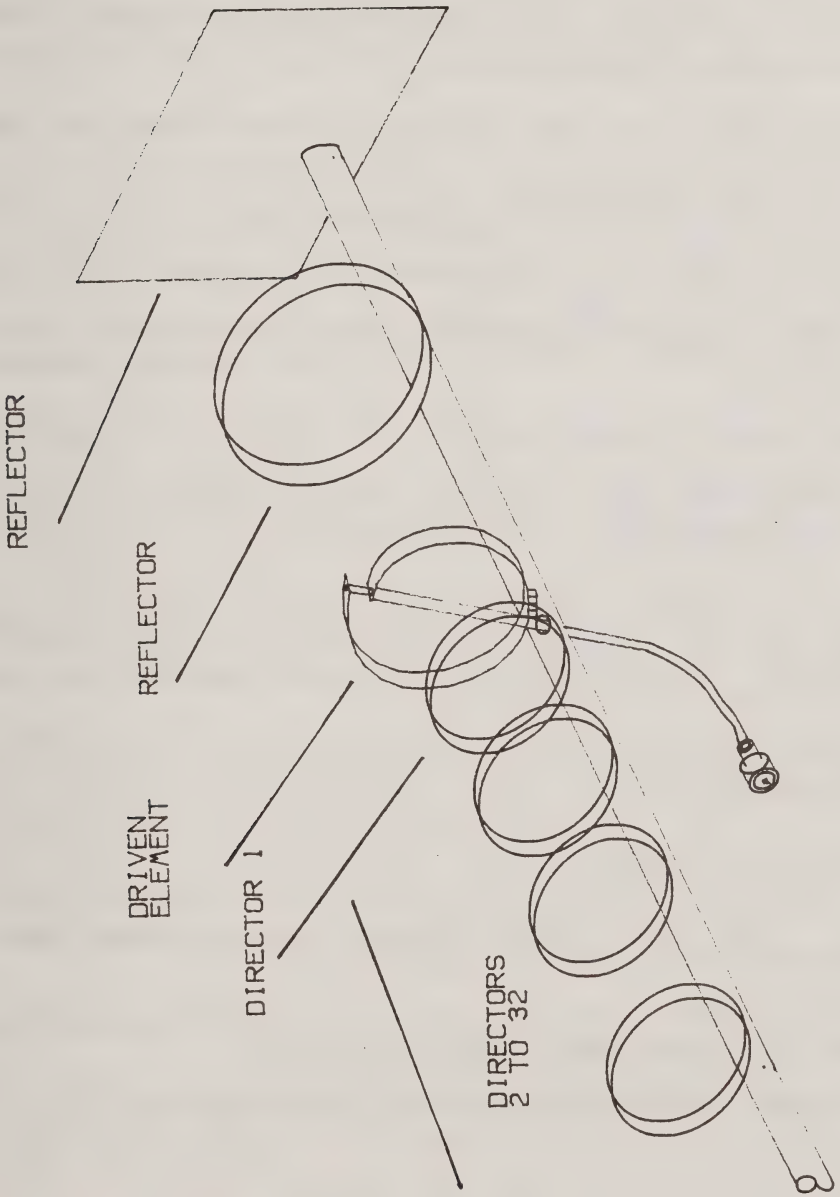
Main Element to Director 1, 0.857 inches

Director 1 to 2	0.634
Director 2 to 3	1.36
Director 3 to 4	1.36
Director 4 to 5	2.72

all other spacings of directors 2.72 inches to end of boom.



LAYOUT OF RING YAGI ELEMENTS:



COMPLETE MODIFICATION FOR WEATHER FAX FOR THE TELECOPIER 400

by ADRIAN NASH, G4ZHZ

At last! I have got round to describing the modifications I have made to my Telecopier 400 facsimile machine for weather charts, press photos and satellite operation.

The electronics to be added give the fax machine the following new specifications:

RPM 60/90/120/180/240/360 RPM (manual selection.)

IOC: 288 or 576 manually and automatically selectable.

FREQUENCY REFERENCE: 2400Hz either external for tape sync or from internal generator. (3600Hz for 90/180/240 RPM internally generated from 2400Hz.)

VIDEO: Normal or inverted video.

FM DEMODULATOR: Wide deviation +/- 400Hz (normal wx fax) or narrow deviation for VLF +/- 150Hz operation.

Option of external video input via a suitable buffer amplifier so that input can be taken from Frame Store or other satellite demodulator. Alternatively, use a AM to FM converter (see Guy Martin's article in RIG Newsletter No 11.

Special Meteosat mode which allows 300Hz start tone to select IOC 288 instead of IOC 576.

Summary of Circuit Elements:

Fig 1 shows PCB 1 reference frequency generator, stepper motor drive and automatic start/stop control circuits.

Fig 2 shows PCB 2 the video processing amplifier circuits. The stepper motor power supply circuits is also shown.

Fig 3 shows the inter-pcb wiring to complete the modifications.

Both circuits can be constructed on strip-board, though printed circuit boards are much better since there tends to be alot of wire all over the place on PCB 1. Although the circuit for PCB 1. is quite complex, most of the circuity is digital, therefore the decrete component count is quite low. I would recommend header plug connectors for all off-PCB connections since fault finding and general maintenance of the PCB much easier.

Briefly the circuit description is as follows:-

PCB 1.- digital circuits.

IC 1. generates an accurate 2400Hz internal reference from a 2.4576 MHz crystal. IC 2,3,4 form a phased locked loop 3600Hz generator that multiplies the 2400Hz input by 1.5. The 3600Hz output is used to generate the required motor frequencies for 90/180/360 RPM, while 2400Hz is used to provide frequencies for 60/120/240 RPM. An external 2400Hz reference can be used for tape recording purposes, or for using a satellite's sub-carrier as a reference (via a 2400Hz bandpass filter).

IC 5,6,7, form a second phase locked loop that converts 2400Hz to 491.5200Hz to 737.2800Hz. It does this by dividing the input by 10 (using IC6) and then multiplying 240Hz or 360Hz by 2048 using IC5,7. For 240 and 360 RPM speeds, the output to Telecopier PCB A4 (logic control module) is taken by a buffer gate from the output of IC 7. For 60/90 and 120/180 RPM, the output comes from divider stages in IC 5. The motor drive frequency is selected is divided by 2048 for IOC 288 or 4096 for IOC 576 scanning densities by IC 8. IC 15a-d form a digital switch allowing the two frequencies from IC8 to be selected and fed to the stepper motor driver, IC 9.

Automatic start, IOC selection and stop are controlled by ICs 10 11, 12 which are tone decoders. ICs 10,11 listen for 300Hz (IOC 576 start) and 675Hz (IOC 288 start) respectively. IC 12 listens for 450Hz (stop signal). Push switches allow manual override. S7 can be used when receiving Meteosat pictures. Meteosat pictures are sent with an IOC of approx 288, but a 300Hz start tone is sent. Normally this would select IOC 576, so closing S7 forces IOC 288 for either start tone.

PCB 2 Video Circuits.

The output from the Telecopier 400's own FM demodulator is fed through a low-pass filter (cut-off frequency of about 1300Hz) to remove any last traces of FM ripple on the video signal. IC 2 is a buffer amplifier.

When 2S1 is in the wide position, IC2 has a gain of one, therefore video from the demodulator is passed through the unamplified. This allows reception of the normal +/- 400Hz fax signals. In the 'NRW' position IC 2 forms an amplifier which compensates for the low output from the narrow deviation, +/- 150 Hz fax signals found on very low frequency transmissions. IC3 is an analogue inverter circuit that provides a mirror image of the video input. When 2S2 is set in the INVERT position, inverse video from IC 3 is connected to the output. This allows negative pictures to be produced, or upper side-band use on a communications receiver (my Marconi marine rx only has upper side-band!).

Stepper motor power supply.

The synchronous motor on the unmodified Telecopier 400 used to move the carrage assembly along the drum is replaced with a stepper motor of the same size (type RS 332-947) to allow digital control of the IOC. However, this motor takes too much current to allow direct power supply from the Telecopier 400's own +14 volt supply. A very simple additional power supply is added consisting of a miniature 12v transformer, bridge rectifier and smoothing capacitor. There is just about enough room between the telecopier 400's transformer and PCB A1 to fit the extra PSU in. This power supply is also used to power a small relay that switches in an extra phasing capacitor for the slow speed of 60 and 90 RPM.

Implementation of the modifications.

Fig 3 shows all the interconnections needed to implement the modifications. Since most of the electronics required are fitted onto two PCB's, the actual modifications to the Telecopier 400 are not too extensive There is only one track cut to be made. Start by removing the metal box on the top right hand side of the machine. this can be done by removing the bottom cover plate (held on by screw on plastic feet), revealing three screws fixing in the metal box. Remove these screws. Disconnect the two white wires going from the box to the PCB A8. Cut any other wires going to this metal box since none of its contents are required for fax operation! This now leaves quite a lot of room for the PCB's etc. However, if there is not enough room to fit the PCB's in the bottom of the machine, screw them to the lid on the right hand side, allowing plenty of length in the wires to allow the lid to be removed and tilted back.

Next locate the little synchronous motor on the gearbox (RHS of the machine next to the drum motor.) Cut the wires going to this motor and remove the phasing capacitor associated with it. Remove the motor by unscrewing two mounting screws.

To allow greater access to the under side of the gearbox, unscrew the two nuts that fix the gearbox bracket onto the carriage rail assembly. You can then tilt the gearbox but be careful not to damage the little belt attached to the carriage. Next comes the hardest part of the modification. Holding the synchronous motor in a vice remove the pinion from its shaft (dont be supprised to see the whole shaft pull out of the motor though!). Transfer the pinion to the stepper motor shaft and push it down on the shaft so that there is about 2-3mm of the shaft visible above the pinion's top face. Using the original screws and washers, fit the new motor onto the gearbox. Before bolting the gearbox back onto the carriage rail assembly, it is a good idea to short out the white wires going to a micro-switch to be found near the gear box on the carriage rail assembly. This allows you to position the carriage at any point on the paper without sounding an alarm and stopping the machine from working!

Refer to the RS component catalogue for wiring details to the stepper motor. Connect the two red wires together to the +12v stepper motor supply.

By removing the PCB modules, make the required connections according to Fig 3. Cable ties can be used to make the wiring to each PCB as neat as possible, attach a small sticky-backed label with the connection name written on it to each wire to aid identification. There are only three alterations to be made to the Telecopier's circuits.

Bridge C1 on pcb A3 (a 15uF capacitor in the top left hand corner of pcb A3.) this inhibits the 15sec "no carrier" time-out allowing the machine to be left on in the stand by state without sounding an alarm.

Remove the crystal and link LK1 from pcb A4. This inhibits the Telecopier 400's own oscillator. Feed the motor drive (MTR DRV) output from pcb1 to pin eight of IC 1 (pcb A4) via screened cable. Connect screen of the cable to ov at both ends.

On pcb A6 (FM demodulator), cut the pcb track connected to connection pad number 8 as shown in fig 3. Unsolder the ends of R38 and R39 that normally go to pad number 8 via pcb tracks and reconnect these ends directly to pad number 8. It is best to drill a small hole through the pcb, connecting R38 and R39 via a short piece of wire to the pad underneath the pcb. The idea is to divert the FM demodulator's output via the video amplifier pcb 2. Pad number 8 used to be the demodulator output.

Unbolt the mains transformer at the left hand side of the machine.

There are three bolts securing the transformer/voltage selector assembly. Locate a blue wire and free it from the assembly by removing a couple of cable ties, also locate wire number B1 (a brown wire). cut these wires (making sure that all power is removed from the machine) and rewire using a connection block to include connections to the primary of the stepper motor PSU transformer as shown in Fig 3.

This completes alterations to the machine's circuits. The final modification is as follows:-

Wire an extra 2uF 400v capacitor up to the 1 uF drum motor phasing capacitor via a small relay as shown in Fig 3. Use the other set contacts on S3b to switch +12v from the stepper motor PSU to the relay when S3 is in the 60/90 RPM position.

Testing and alignment

When completed and checked about three times (because there is a lot of wiring and we do not want to blow up the Telecopier do we !) switch the machine on at the mains switch. Now press the orange button on the right hand side of the machine. Nothing should happen providing the machine is in receive mode (don't forget- you can still send pictures too!) Put S2 in the 60/120/240 RPM position and select 120/ 240 RPM on S3. Connect a frequency counter to TP1 on PCB 1. This is pin 4 on IC 7. Ajust TC 1 for a reading of exactly 491.5200 kHz. This must be ajusted as accurately as possible otherwise you will get skewed pictures at 240 and 360 RPM. Select 90/180/360 on S2 and check that the phase locked loop will go up to 737.2800 kHz. If it doesn't try decreasing the value of C5 until it will cover both 491.5200 and 737.2800 kHz.

Now apply a 1200Hz tone to the input of the fax machine. Have 2S1 set in the wide position and 2S2 in the INVERT position. Check that you get about 7.8v at 2TP1. Now apply a 1600 Hz tone and select NRW on 2S1. Adjust 2PR1 for 7.8v at 2TP1. With 7.8v at 2TP1, connect the test meter to 2TP2 and adjust 2PR2 for about 0 - 0.6v. Apply a 1300Hz tone and check that the voltage at 2TP2 raises to about 7.8v. If it doesn't re-adjust 2PR2 so that it does.

Next temporarily disconnect "VIDEO" from PCB 2 and connect a signal generator with about 2v output up to "VIDEO" on PCB 1. set the generator to 300Hz and carefully adjust PR1 until pin 8 of IC 10 goes low. Repeat this procedure for IC 11 using 675Hz and IC 12 using 450 HZ. (If you have no signal generator then use a fax signal start and stop tones off air.)

Check that the machine starts up when you press either MAN 576 or MAN 288. Pressing MAN STOP should stop it. Connect a FM fax signal to the input of the machine, setting the speed controls to suit. Having started the machine manually or by fax signal, check that the PRINT LED is illuminated after about thirty seconds from starting, Check that the carriage starts to move along and that selecting IOC 576 causes it to go twice as slow as for IOC 288 (you can change IOC while it is running by pressing MAN 576 or MAN 288). After the machine has been stopped, observe the printed image. There should be no signs of skewing, and if you recevied the signal with the INVERT switch in the wrong position for the side-band used (should be INVERT for USB, NORMAL for LSB) then the image should be in negative form. If the image seems stretched too much then you have probably selected the wrong IOC. If however, the IOC has been selected correctly and you have a stretched image, then the motor has been wired up wrongly so that it goes backwards. To cure this, rather than re wiring the motor, simply disconnect pin 3 on IC9 (PCB1) from ov and and re-connect it to +12v.

Final checks are that when the machine is set for 60RPM, the motor capacitor relay closes and that the drum goes round at one revolution per second. Check also that when the machine is in standby, you can turn the motor by hand-if you can't then the motor is then trying to turn with no drive and will over heat, check the wiring between pcb A4 and PCB1

Satellite reception.

If you wish to feed video directly into the Fax machine, then you will need to make a simple buffer amplifier that converts 1v video to 7.8v peak video. A suitable amplifier is shown in Fig 2. Adjust the 50K preset resistor to give 7.8v for peak video input (1.1v) the output from the video buffer amplifier can be switched in at the point shown.

The above system will give the best results and is particularly useful for providing hard copy from a Frame Store AM demodulator but if you have built a G8NFU style " Fax transcoder" , then this will work with the modified Telecopier, feeding in FM directly. (See RIG newsletter No. 11.)

Tape sync can be fed by a buffer amplifier into the ext-sync input which is CMOS compatible at + 14v peak. (By the way - quick ERRATUM here - it is a good idea to put a 100nF capacitor between ext-sync input and input to IC 13b together with a 100k resistor between IC 13b input and Ov.)

When receiving METEOSAT, select the METEOSAT mode so that you will get the right IOC setting when the machine starts up automatically.

Some ideas for locating the printed circuit boards:

There are three approaches to actually placing the two PCB's required for the telecoper 400 modifications.

a) You could try producing a pcb with all of the circuitry including the video amplifier on one pcb and then squeezing this some how into the fax machine. You could also have to separate and as I have done, have the main pcbs bolted to the cover of the machine (on the right hand side) with the stepper motor driver circuit on a separate small pcb near the stepper motor. The problem with either of these solutions is since there is quite a lot of circuitry, the pcbs will have to be designed very carefully to fit into the small space available.

b) It may be possible to construct a mother board and split the circuit up into plug in modules, in line with the rest of the circuits in the telecopier. This is probably the neatest though the most expensive method of housing the circuits and should allow the complete circuit to be fitted into the machine itself.

c) House the frequency generator and logic circuits in a separate unit that sits next to the telecopier 400 and plugs into it via a DIN lead. This is probably the most practical way of arranging the modification pcbs. The video amp and stepper motor driver IC along with the stepper motor pcb are housed in the machine its self with the frequency generator, start/stop control all housed in the separate unit. The following connections are then needed between the two units:

0v, +14 (from telecopier),
MTRDRV (via screend cable),
STEPPER DRV,
START, STOP (both are active low),
VIDEO IN (from video amp pcb).

The advantages are that it will be a lot easier to arrange the controls on the telecopier 400 since only about three toggle switches need be located on the telecopier with all the other controls on the separate unit. The wiring in both units will be simplified.

Figs 1 and 3 are intended to be a centrefold pullout and Fig 2 is on the next page

RIG 13

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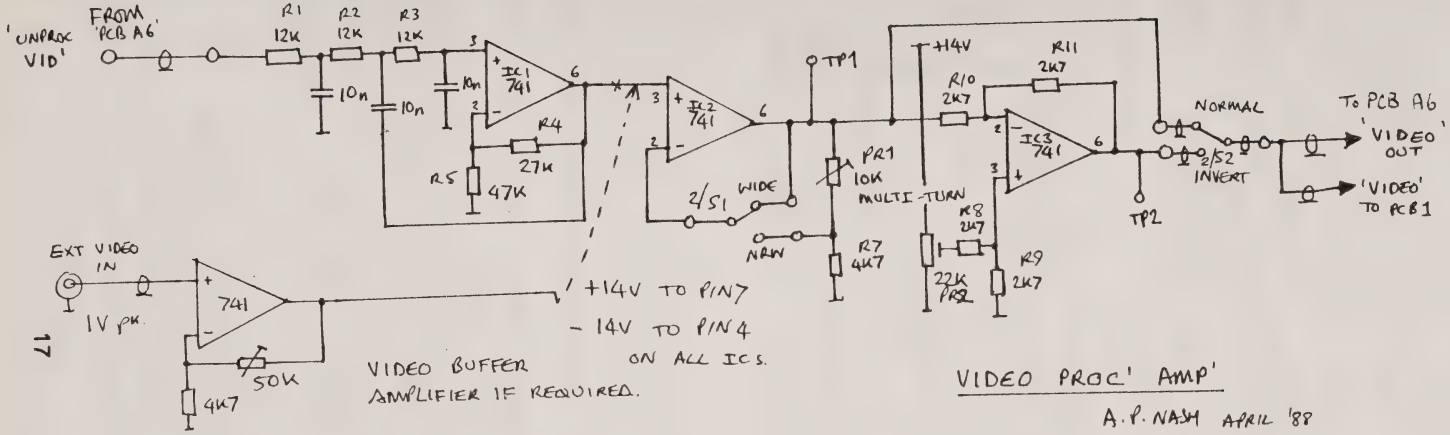
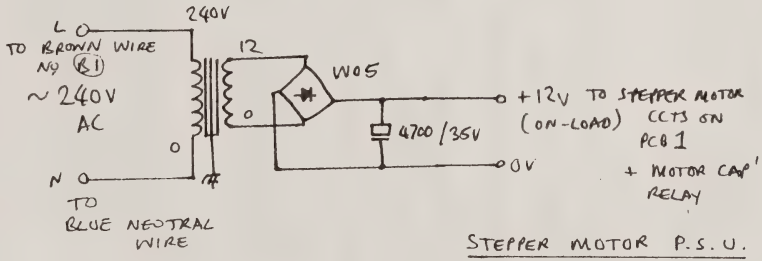
FIG 2

TELECOPIER 400 MODIFICATIONS 2.



VIDEO PROC' AMP'

A.P. NASH APRIL '88



STEPPER MOTOR P.S.U.

AP NASH APRIL '88

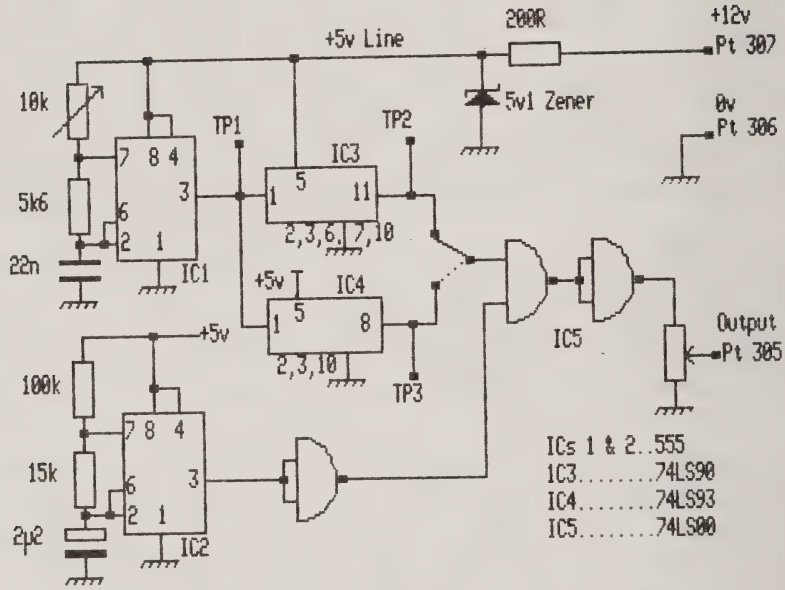
ADJUST PR-1 SO THAT WITH A 1300 Hz TONE APPLIED YOU GET APPROX 0.6V AT TP1. APPLY A 1600 Hz TONE, ADJUST PR1 FOR APPROX 7.8V AT TP1.

ADJUST PR-2

WITH 7.8V AT TP1, ADJUST PR2 FOR APPROX 0.6V AT TP2. CHECK THAT WITH 0.6V AT TP1 YOU GET APPROX 7.8V AT TP2 – ADJUST PR2 AGAIN IF REQUIRED.

SYNC TESTER FOR LOK PCB

by Grant Dixon, G8CGK.



Notes on above circuit:

1 IC1 generates 4160 Hz. This should be set with a frequency counter.

2 IC3 Divides by 5, 4160/5 832Hz

3 IC4 Divides by 4, 4160/4 1040HZ

4 IC2 Provides a gating pulse so that the output consists of bursts of the selected frequency. Timing is not critical.

5 It might be a good idea to replace the 10k variable resistor with a 500R or 1k in series with the appropriate fixed resistor to make it easier to set the frequency accurately.

Minutes of RIG AGM - April 1978

Henry Neale welcomed all present, and after pointing out the temporary absence of our secretary/editor, introduced those members of the committee who were present; Peter Braizer - Treasurer/exhibitions, Colin Hall - School liaison, Stan Ames, and last but not least, Des Watson - membership secretary. Apologies were noted from Dermot Dobson and Les Currington.
The minutes of last years agm as printed in the newsletter were formally accepted following a proposal from Mike Coombs, seconded by Des Watson. Our secretary had crept into position at this point!

CHAIRMAN'S REPORT.

The current membership renewals at under 1000 for '88 was compared with the 1000 plus for the previous year. It is anticipated that this figure will rise following our attendance at rallies during the year.

It is hoped that the next Newsletter will contain a contribution from Weatherwatch at RAE Lasham. Despite encouragement in RIG newsletter for RIG members to get on the Weatherwatch mailing list very little information had been forthcoming. By offering space in the RIG newsletter Henry hoped this would be a low cost/effort/time exercise for Weatherwatch to distribute NOAA information to those who need it and that this will become a regular news feature.

Henry announced that at least three members had built successful High Resolution receiving systems (Meteosat or NOAA) and that images stored on disc might soon be available for the IBM PC with an attached framestore. Henry also said RIG images have been acclaimed world wide, having appeared in several other satellite journals.

Dartcom are busy working on modifications to their hardware in order to cope with the problems experienced by many members by interference from the new paging systems around the country. Henry requested that members should share their ideas and successes in coping with the problems of interference.

Henry pointed out that Peter Braizer wanted to be relieved of the treasurers job in order to concentrate as the Exhibition/Rally Organiser. As expected there were no takers!

The chairman expressed his enjoyment at attending Rallies and welcomed the opportunity it gave gave him to chat to other enthusiasts. The planned attendance of Colin Hall at the third International Satellite Direct Broadcast Services Users Conference in the USA this coming June was announced.

RIG has agreed to provide some financial sponsorship for the trip, and Henry announced that Colin would be presenting a paper on Satellites in Education. Colin added that British Aerospace, British Telecom and the DES had also expressed an interest in the venture, with the possibility of some sponsorship.

In future, RIG newsletters would contain a very late news page, so that items could be included close to the printing date. On the subject of the newsletter, the chairman made a plea for more articles to be forthcoming from members. (also images and station profiles)
RIG has now got Mailbox on Prestel, more on this later.

SECRETARY'S REPORT

Phil commented on the increase in correspondence, partly due to the publicity following the Short Wave Magazine article. Apologised for the lateness of many replies, or even the absence of them. Asked members to be patient with him, like all committee members, he has other claims to his time, like his family, work etc.

Some discussion on the IBM/framestore interface articles and the availability of the software on disc to members took place. The possibility to dump images on on dot-matrix printer for hard-copy, and the possibility of software for driving a laser printer in the future were also discussed.

General comments from Phil that it was not possible to provide suitable software for all the machines members use. Members could help each other here more. A reminder that articles for the newsletter must be in on time, a request for members to contribute more material for the newsletter. Phil will continue to provide articles on satellite TV if interest is shown.

The RIG telephone answering machine is now in place and usually only switched on when Phil wasn't around to answer the phone personally. He appreciates that many members find these machines very impersonal, but urges them to leave a message when confronted with the machine rather than hang up.

The secretary concluded by confirming that RIG was now on Prestel, but that a further fee would need to be paid in order for us to have frames on Micronet as does the RSGB and BATC.

TREASURERS REPORT

Peter announced that the accounts now run Jan to Dec in order to fall in line with membership renewals.

OHP transparency was projected containing a brief outline of the years transactions. The large amounts present were pointed out to be due to Dartcom product sales.

Following an enquiry from the floor Peter promised to look in to the possibility of more profitable investments such as a deposit account. Phil commented that it was not that simple, because of taxation problems and administration overheads. The committee would look into the matter more closely.

The intention to obtain more equipment for the RIG stand was announced, and that this should reflect the best that was available and affordable for members probably not HRPT. A further suggestion from a member was that we should include some "professional" type images on the stand such as the NRSC images distributed by Spacetech. Phil confirmed that he already had some and that they would be suitably mounted for the displays at rallies. Improvements in the frame store were commented on by Phil.

A question from the floor concerning insurance. Peter confirmed that we were covered for 3rd party liability, but that some of our stock was not insured. Peter concluded by stating that the fully audited accounts would appear in the next RIG newsletter.

Election of Committee.

Following proposal from Mike Coombs and seconded by Trevor David that Henry be re-elected as RIG Chairman, Henry pointed out that the committee preferred that it would appoint its own officers once it had been elected. He announced that Bob Leggett had resigned and would not be standing for re-election.

The committee was re-elected on block following a proposal by Michael Gill (G6HOM) seconded by John Osbourne. Following a request to the floor for more members to join the committee the following two volunteered:

Mike Coombs	Proposed Peter Braizer	Seconded	Stan Ames
Ian Gurton	Proposed Stan Ames	Seconded	Phil Seaford

Question and Answer Session.

The question of RIG attending the AMSAT Colloquium was raised. Henry explained the reasons for his lone attendance in 1987 and passed comment on the forthcoming 75 years RSGB celebrations.

Des Watson will produce a map showing the distribution of UK members; this was also in response to members request.

A member proposed a vote of thanks to the committee for all their hard work throughout the year.
John Osbourne raised the question of the membership renewal form. All agreed that it was a good move. The suggestion that we should pay by Direct Debit was greeted with a groan from the treasurer.

Contacts with other satellite interest groups around the world was raised. The Dallas RIG bulletin board was commented upon, and the 20 mins access time for the index download was explained. Reciprocal arrangements for various newsletters was confirmed. Des Watson announced that he has access to regular Keplerian Elements and that he would make these available to members on request. This followed a members query regarding COSMOS 1602.

(Editors note: We still are unable to provide elements for Cosmos 1602 - apparently NASA no longer recognise it as a operational satellite even though it appears to be working again - any offers?)

The general lack of information on the Russian Satellite scene was commented on. Henry concluded with the news that Geof Perry of the Kettering group and others had written articles and that RIG would print anything that was available on the topic.

The meeting was closed at approximately 4.15 pm, 41 members were present.

Please note:
Due to temporary printing problem all pound signs in this issue are represented by a hash sign.

RIG are planning to attend the following rallies during the rest of the year:

15-17 July	RSGB National Convention, National Exhibition Centre Near Birmingham
7 August	RSGB Mobile Rally, Woburn Abbey, BEDS

RUSSIAN SATELLITE CORNER by James Brown

Whilst Les is away in Singapore (no doubt on a RIG recruiting drive) I have been deputised to keep the seat warm indeed at times it has become a hot seat! This report is up to the 7th of May, so any activity after this date will not be mentioned. Here then is the latest round up.

METEOR 2/14 (86-39A) 137.85 MHz.
This satellite hasn't been heard for a while, and in view of the current three operational METEOR series satellites, and its faulty gain control, it can be presumed to have accepted the offer of early retirement.

METEOR 2/15 (87-1A) 137.85 MHz
Up to a short time ago this satellite was fully operational, but for the last few weeks it has not been heard, though this is presumably because the spacecraft is now largely looking at the darkened area of the earth.

METEOR 2/16 (87-68A) 137.4 MHz
Excellent APT reception is regularly received in the early morning period from this space craft. The inclination of the N/S orbit currently favors a good fetch into Africa. It should be possible to see as far south as Cairo on a pass to the east. However this will mean a slightly curtailed view of the polar ice cap from some locations (like mine!). By the time you read this article I imagine the drift to the east will result in considerable under illumination of the western side of the picture.

METEOR 2/17 (87-05A) 137.3 MHz
The format is virtually the same as for METEOR 2/16 though the pass time is slightly later. Transmissions are regular and on board systems seem to be working ok.

COSMOS 1602 (84-105A) 137.34 MHz.
In the period from about April 18th sporadic transmissions began to be received again from this satellite. At first it was only for a minute or two, with no picture information, only telemetry, and with large fluctuations in the RF output. A few days later pictures began to be transmitted albeit spoiled by contrast fluctuations. Gradually the signal strength came back completely and as the on board systems came properly back into operation well-nigh perfect pictures could (and still are) being received.

Indeed even at night as the satellite comes down from the pole pictures are still being transmitted.

It is well to bear in mind that there are usually logical explanations for what seemed to be "eccentricites" of satellites after consultations with Geoff Perry the above description ties in perfectly with a satellite re-emerging from an "eclipse" period when the satellite would be unable to receive solar energy and would have gone into a "stand by" mode. Re-emergence has restored power and the systems have gradually reactivated and become operable. Sadly the satellite is not sun-synchronous and will be soon poor for morning reception. However the evening pass will become late afternoon and useable. Note the unusual frequency possibly due to ageing.

COSMOS 1766 (86-55A) 137.4MHz.
One or two transmissions have been reported from this spacecraft in the late April early May period both night and day. Usually there has been no picture, just telemetry but BIRGER LINDHOLM from Dalsbruk in Finland reports a pass with a radar picture on April 26th on 137.38 MHz.

COSMOS 1869 (87-62A) 137.4 MHz
Again nothing to report from this bird. It looks very much as if the radar aerial deployment problems have caused its early demise.

METEOR 30 (80-51A) 136.97MHz
What else can we say about a satellite which enjoyed its eigth birthday earlier this year! Despite the problems of what looks like a faulty gain control or jammed iris, we continue to receive excellent land detail pictures (as it was primarily designed for) Lastly with an eye to the future - what can we expect ? Fistly the bad news ! It appears that another Russian satellite in the Cosmos series K1939 has been launched, but with no VHF SDUS transmissions, only PDUS high resoultion digital transmissions in the usually "S" band region. Time alone will tell if this is deliberate policy. We are still hoping for another replacement for K1766 so we will keep our fingers crossed. The good news is that if things go according to plan we will be looking to start a Chinese satellite corner. A pair of polar orbitors are planned by the early 1990's with VHF APT, and it's possible that an experimental version will be up as early as late this year/early next year. I now hand you back to Les.....

James Brown.

KEPLER ELEMENTS provided by Max White
ROYAL GREENWICH OBSERVATORY, HERSTMONCEAUX CASTLE

	MET 3-1 137.85 MHz 85-100 A	MET 2-17 137.30 MHz 88-05 A	MET 30 136.97 MHz 80-51 A
EPOCH OF DATA	88128.49223983	88128.76577310	88128.77498838
ACCELERATION	0.00000043	0.00000063	0.00003076
REV NO			
INCLINATION	82.5506	82.5408	97.7089
R. A. NODE	162.6159	242.6660	218.3408
ECCENTRICITY	0.0018293	0.0016502	0.0041655
ARG OF PERIGEE	230.0533	332.4239	151.6533
MEAN ANOMALY	129.8989	27.6044	208.6987
MEAN MOTION	13.16927610	13.84023458	14.99214703
SEMI MAJOR AXIS			

	COSMOS 1766 137.4 MHz 86-55 A	NOAA 9 137.62 MHz 84-123 A	NOAA 10 137.50 MHz 86-73 A
EPOCH OF DATA	88128.78438190	88128.45765982	88129.56410342
ACCELERATION	0.00000562	0.00000147	0.00000148
REV NO			
INCLINATION	82.5261	99.0979	98.6804
R. A. NODE	52.0574	102.6607	160.9266
ECCENTRICITY	0.0024776	0.0016286	0.0013987
ARG OF PERIGEE	340.8191	15.6896	348.6868
MEAN ANOMALY	19.2059	344.4777	11.3993
MEAN MOTION	14.73694167	14.11583645	14.22569496
SEMI MAJOR AXIS			

	MET 2-15 137.85 MHz 87-1 A	MET 2-16 137.4 MHz 87-68 A	COSMOS 1869 137.4 MHz 87-62 A
EPOCH OF DATA	88129.05430135	88129.09388195	88129.07576032
ACCELERATION	0.00000055	0.00000018	0.00000448
REV NO			
INCLINATION	82.4637	82.5572	82.5168
R. A. NODE	118.6987	180.4624	112.7247
ECCENTRICITY	0.0012730	0.0010790	0.0026549
ARG OF PERIGEE	323.5521	250.8427	46.8575
MEAN ANOMALY	36.4775	109.1572	313.4848
MEAN MOTION	13.83588064	13.83345266	14.73547526
SEMI MAJOR AXIS			

THE P.A. ELECTRONICS FAX DECODER

by Stan Ames.

This device represents another way for the BBC computer owners to produce images from radio signals. Unlike others recently reviewed in the RIG newsletter, it is designed to operate from earth stations sending "Fax" type signals. These signals are very similar to those sent by weather satellites except that the audio tones are frequency modulated instead of amplitude modulated to produce light and dark shades on the picture.

To receive these pictures you will need a general coverage H.F.(short wave) radio receiver with the ability to resolve SSB signals. Strong Fax signals can be found on 4.608 and 4.779 MHz from Bracknell and if you tune up and down the bands, you will soon get to recognise their distinct sound and find many others. The Klingenfuss guide to Utility stations is useful for finding and identifying the stations.

Another important source of fax siganals is in the VLF band below "Long wave" at 100 to 150 kHz. You will probably need to make some special arrangements to receive these signals. Both Microwave Modules and Datong make converters for this band with output on the two meters or 10 meters amateur bands.

The audio output from your receiver is fed to the converter which is attached to the BBC user port. Software is supplied on disc which allows the decoding of a range of standard Fax signals such as news service images, weather maps and processed satellite pictures. You can adjust the format from the key-board to give different height/width ratios. The images are displayed on the monitor but there is also a facility sending the image direct to a dot matrix printer. The screen images can also be saved to disc for later retrieval and if you have a screen dump utility, hard copies of the saved images can be printed.

Just like the "Infotech" board reviewed in the October 1987 RIG Newsletter, the quality is limited by the ability of the BBC to give only a small number of grey tones. This is a serious limitation to the quality of the photographic images but not the weather maps. These only contain only black and white and you should with practice, be able to produce them very well on your monitor.

Our pictures will not be as good as the RIG centrefolds, but for #59.95 its a cheap route to image reception if you have a BBC and will provide good quality weather maps on screen or printer. The interface seems to work quite well but I feel that they could offer better value with a built and tested board as well as the cased unit.

Many of you would appreciate the lower cost and possibly make a better job of the case as they do (I'm re-casing mine!).

The frame store will also resolve these Fax images despite operating on the wrong kind of audio modulation. Very good results can be obtained if you have a receiver with some control of bandwidth. If the bandwidth is reduced enough, the amplitude of the audio can be made to vary sufficiently by slope detection to give a good range of grey tones.

---------- ERRATA ---------

Two corrections to the article on an FM adapter for satellite recordings in December 1987 RIG:

1. There should be a 15 nf capacitor from pin 3 of the second op-amp down to ground.

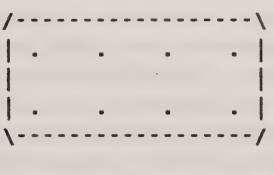
2. The text on page 6 (penultimate line) should read..... running at 7.5 IPS it has been possible.....etc.

The connections to the balanced mixer for the VLF up converter in the MAR 88 issue were incorrect.

The connections are:

Pin 1 is the output
(surrounded by blue circle)
Pins 2,5,6,7 are all ground connections
PIN 8 is Local Oscillator input
Pin 3,4 joined together as the input

Pin view:



Quad-loop YAGI by Henry Neale

As mentioned in my chairman's report, I have eventually received the report on my proto-type Quad Loop Yagi from Roy Powers who is obviously as busy as I am! But they were certainly worth waiting for. The forward gain was measured at 22dbi, the sidelobes are 13db down on the main beam and the front to back ratio was 17db. The later was the figure that I was most disappointed with, but Roy pointed out that it would be improved by increasing the dimensions of the mesh reflector to about 2 wavelengths 350mm. Before taking the antenna to Roy, Peter our treasurer and myself did do some simple tests on it at Peters QTH. The results of these test showed that I had done a reasonable job, because it proved very difficult to measure any difference in signal level from Peter's own 1M dish and my Quad Loop Yagi. It was down by just an odd db or so, which was just visible when there were no R.F.preamplifiers in circuit in either system. A small amount of noise on the dish system was visible with just that few percent extra noise on the Quad Loop Yagi system. This all fell in well with expectations, which was confirmed by the performance figures measured by Roy.

The construction of the antennae was quite simple when I finally started, but I had been very apprehensive initially, double and treble checking my figures. However, when I did get started it proved to be quite a simple task, the only major snag was backache, so I suggest that if you do embark on this project you make sure you have a reasonable size work-bench and a good chair to support your back (its these over 40s again). First start with a convenient length of 15mm square aluminium tube about 8ft. long and mark out all the holes that have to be drilled. As I intended to mount the antennae from behind the reflector, I left a few extra inches here. Any clamping action produces extra stress so I felt that it was necessary to reinforce the tube at this end and this was done by a tight fitting section of solid dural, which went beyond the second director (perhaps a piece of treated hardwood would do the same job). At this point I feel I should mention a little more on the general design at the driven end. The rear element if you can call it that, is a mesh reflector followed by another ring shaped reflector then the driven element. As the gain can be optimised by moving the rear mesh reflector, I didn't fix this until testing the overall unit, I just marked it's theoretical position, leaving say an 50mm extra rearwards adjustment. All the holes can then be centerdrilled using a small drill bit (1/16inch to start with), through the square boom, but I do recommend you use a drillstand to ensure that all the holes are central and perpendicular to the boom.

I will now describe the construction of the elements with the exception of the driven element and the mesh reflector.

These are all constructed from 2.1mm diameter solid copper wire. This is not a readily available commodity but suggested sources are as follows; scrap electrical cable, scrap coaxial cable centre conductor, possibly small copper pipe. My own source was the local electrical engineer, who had some old 70mm cross-section single cable (very heavy current). I only needed 500mm length which I think will be sufficient for about 2 antennae. The important thing is that it is nice and clean, solid (but pipe is ok) and about 2.1mm diameter. Stranded conductors will not be suitable. This copper wire (it's a bit thick to call wire but I will continue to do so) is cut into lengths which are the circumference, straightened and then bent into circles as described later. The ends are soldered together producing a whole batch of rings, as these frequently have differing circumferences it is advisable to keep them in the correct order on a bar or something, making the next steps easier. As the components are of differing metals, I have used the mushroom shaped insulators used on heatsinks (3055 size) both on the top and at the bottom of the boom thereby insulating and isolating the copper from the aluminium and hopefully keeping corrosion at bay. The holes through these insulators are usually 6BA, so a packet of 1" x 6BA cheeseheaded bolts is required together with sufficient nuts. The nuts and bolts should be brass. The slots in the bolts need to be filed with a vee file and tinned to give a good clean and firm location to solder the copper rings into. With quite a few of these to solder together, I thought it would be advisable to make a simple jig to ensure all the elements are reasonably accurate, the only variable is the circumference of each element. As usual Henry comes up with something which is quick, simple and cheap - a piece of wood - about 75mm X 125mm or larger and about 12mm thick. Draw a straight line along the middle. A few mm in from the edge make a mark and then measure 72mm to the next mark. Using the second mark as the centre draw a circle 22mm radius. From the first mark draw a line that is 2mm from being a tangent to the circle (it just misses), repeat on the other side of the circle. The only other thing left, is to make a small depression sufficiently deep enough to allow the head of the 25mm X 6BA to drop in but not be too wobbly, this allows the threaded portion of the screw to lay flat on the wood. This depression is located just outside the circle on the centre line. The 6BA screw thread and the copper wire are of similar size and this arrangement allows them to be positioned relative to each other prior to soldering (it also saves your fingers from being burned). The circle and the lines are used as a guide only and with a little practise it is possible to do this operation quite quickly.

The copper wire is quite stiff and will require straightening. This is a simple operation and requires two more pieces of wood. The wire having been approximately straightened and then cut to length reasonably accurately,

is simply placed between the two pieces of wood, which are then rubbed together, rotating the wire, pressing on the wood at the same time as rubbing straightens the wire. Don't use the same piece of wood that you marked out as the rubbing will obliterate the lines. Now that you have a straight piece of wire you have to bend it, but this part is more difficult. You need something which is of similar diameter to which these rings will finish up, preferably with several different diameters on it, some larger but one just slightly smaller than the finished size, I used a 2" lens, the metal mount was just right. One end of the straightened cut wire is firmly held against this tubular object while the rest is bent around it. It is important not to get any bends in the wrong plane, this is made easier by holding the wire against the flange of an even bigger diameter. It is also advisable not to try to get the wire down to the correct size immediately, but to do it in stages finishing with a size that is just a little below the correct size, overlapping by just a mm or so. When removed you can spring it apart to allow the ends to butt up to each other. I soldered the ends together which also tins them for the next operation. I filed the slot in the brass cheeseheaded 6BA screws into a gentle vee shape to give a better locational shape, it was also tinned before placing in the jig. By aligning the screw along the centre line and the ring on the circle, I was pleasantly surprised at the ease and uniformity of the finished product. Yes they are of different diameters but it was quite easy to allow for this. My Quad Loop Yagi has a total of 35 elements plus the mesh reflector. The ring reflector and all the directors can be assembled using the jig. The following is a description of the driven element. It is cut, straightened and bent in the same way as all the other rings, but the ends are chamfered so that there is more clearance at the soldered connections to the feed coaxial cable. The cable itself is RG141 a solid dielectric PTFE cable, solid centre conductor and copper tube for the outer, all in diameter of approx. 3.5mm. It is special and it is expensive. But you do not need much of it. The only other item you need is a brass OBA X 25mm bolt and nut. Now the difficult bit, a hole for the RG141 to slide through has to be drilled through the centre of the bolt! I will leave you to your own resources there and go to its assembly. The RG141 end is prepared by removing a small wedge of the outer copper on one side. Sufficient for about 1mm of the centre conductor to show through for soldering to. Opposite to this wedge that you have removed, the copper screen is used for the other connection. The RG141 is placed across the diameter of the ring and the ends positioned so that they touch their respective contacts. The chamfering allows these to fit closely and the PTFE insulation helps by not being sensitive to soldering temperatures.

With the centre touching one end of the ring and the copper screen touching the other, get them soldered quickly!

Now something different, the ring needs to be squashed slightly. It needs to be about 5mm wider than it is high, go gently. You can then slide the OBA bolt on the other end of the RG141, head first. Where all three meet, they can be soldered together. As I could not find any mushroom insulators large enough for OBA, I omitted one here, trusting that as there was a fair thickness of metal to withstand any corrosion for some time. Don't tighten the nut up too tightly. The final thing to describe is the mesh reflector. It is 350mm square and in my case was expanded aluminium. It's position is axial with all the other elements. It's centre has to be found. At a point 39mm from the centre and perpendicular from one side a mark is made. A cut in the shape of the letter H rotated 90 degrees on it's side is made, the major dimension being 16mm. The centre part is bent backwards and outwards, until the gap is 15mm. A small clamp is required to hold this in position.

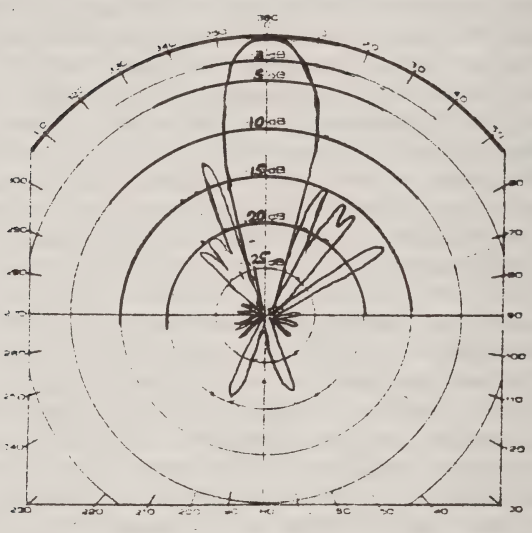
Well that completes the description and construction of the aerial. It is not designed to stand much wind as it is and it is suggested that after it has been mounted on a south facing wall (or nearly so) a set of 3 or 4 nylon or plastic guys are added to support the far end. Remember some plastics degrade in UV light. The guying points can simply be small rawlplugs strategically sited. Waterproofing was simply a small blob of silicone rubber sealant on the end of the RG141, and the copper rings are dipped in lacquer, varnish or equivalent, while they are reasonably clean and bright.

Plugs for RG141 are quiet expensive but are good quality, however if they are not obtainable the small entry N type are very nearly perfect, the insert that normally goes under the braid is a sliding fit to the outside of the RG141. If you solder this on to the outside, a suitable distance in from the end and fit the plug in the normal way, not forgetting to put the nut and rubber sleeve on first. After it is all tightened up all that needs to be done is to solder the RG141 screen to the nut to give it further support.

Consideration should also be given to the RG141 route to the outside world. After it leaves the OBA nut and bolt, even though it is reasonably stable and stiff it does need support so an additional clamp to suit is required and is left to your own discretion. One final point is that if a coax run of more than say 300mm is anticipated the consideration of the fact that RG141's attenuation is similar to other thin coaxial cable, and it would be advisable to change as soon as possible to low loss type such as FHJ250 etc. Also remember, that as the antennae has less gain than a 1m dish, you cannot afford to loose much anyway.

see page 55 for JIG diagram

Henrys diagrams 1

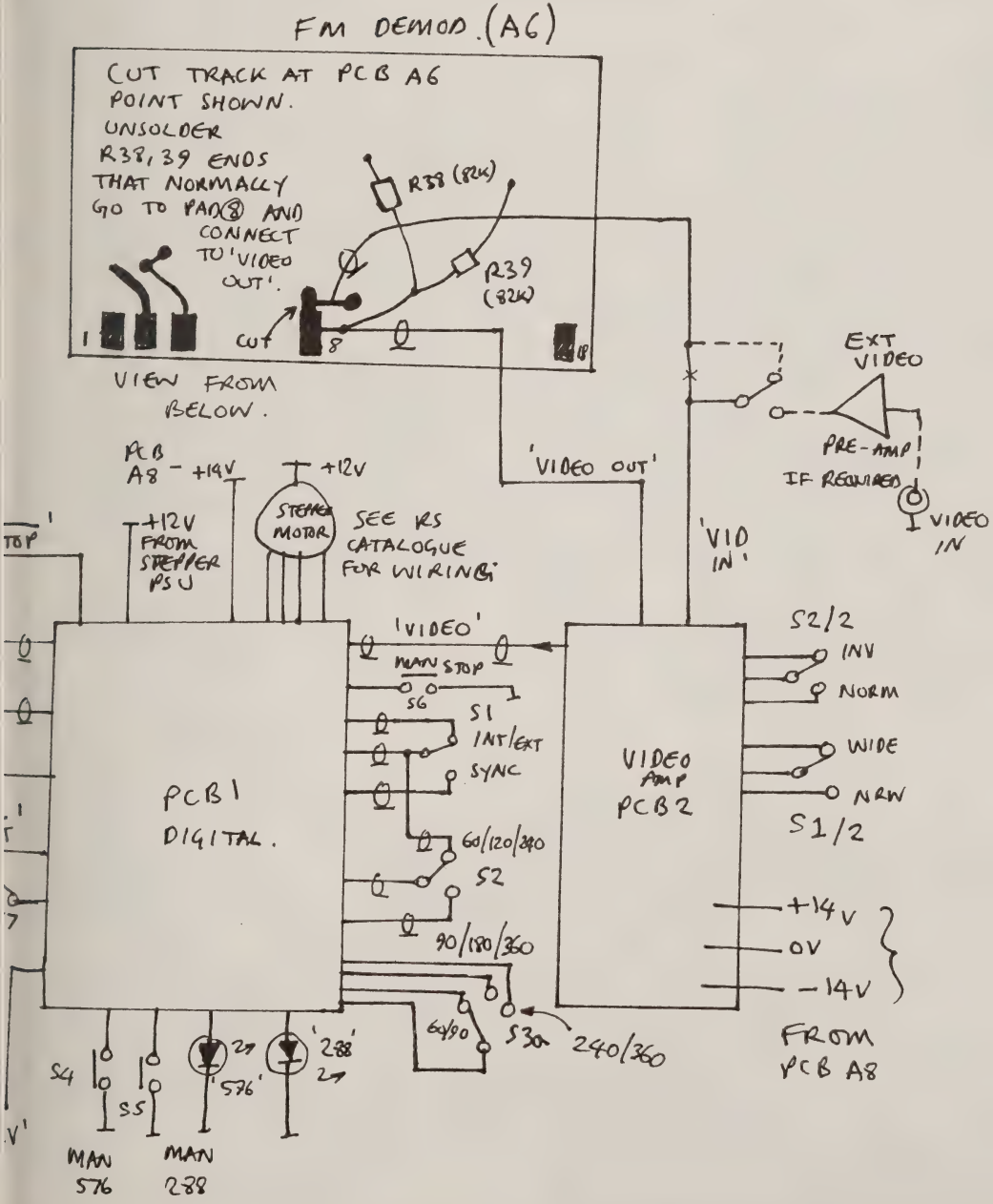


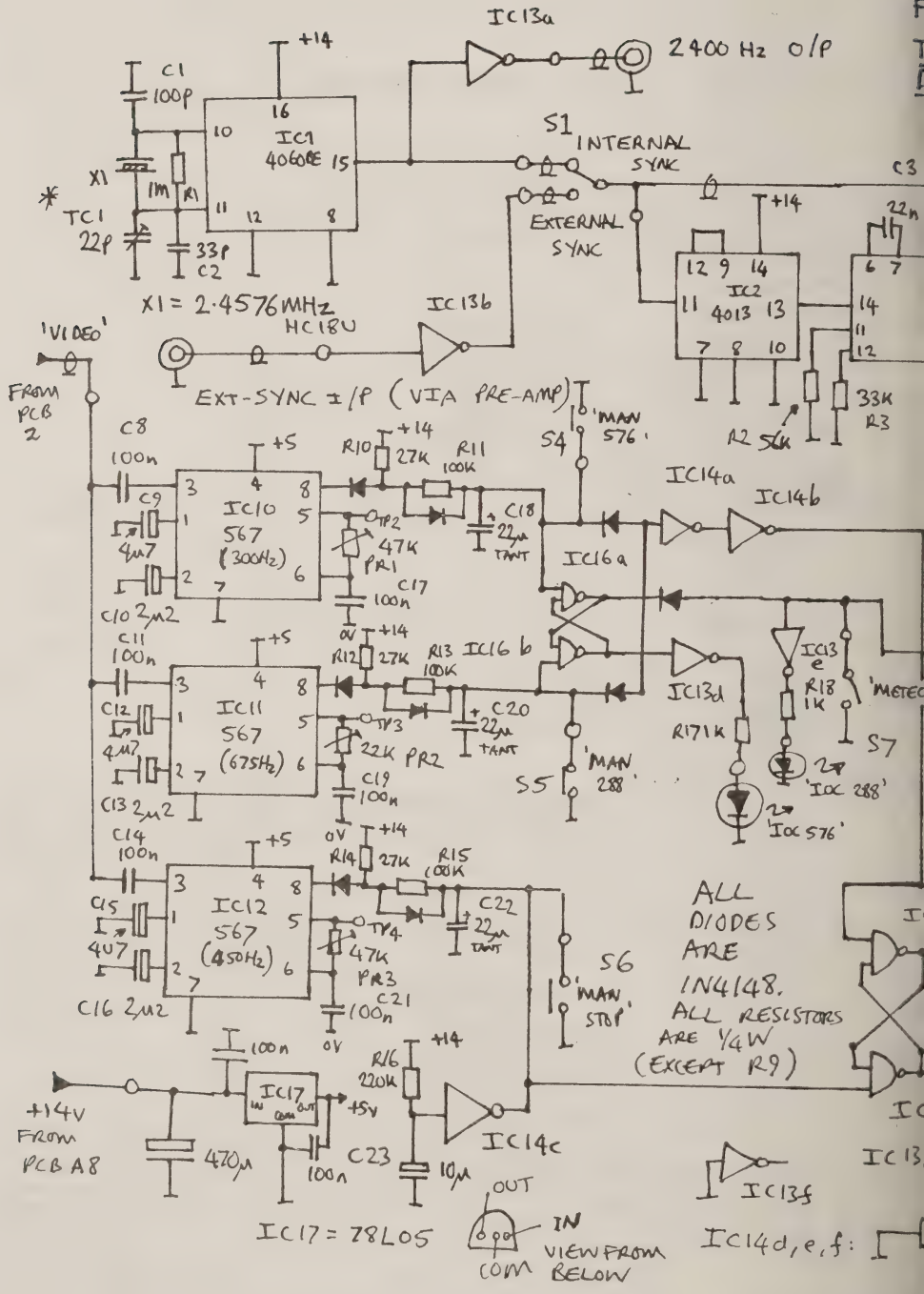
Element Dimensions in mm		
Mesh	350 x 350 7mm max hole size or plate	
Reflector	188	circumference
Driven element	179	..
Director 1	160	..
Director 2	160	..
Director 3	160	..
Director 4	160	..
Director 5	160	..
Director 6	160	..
Director 7	159	..
Director 8	158	..
Director 9	157	..
Directors 10 & 11	156	..
Directors 12 & 13	155	..
Directors 14 & 15	154	..
Directors 16 & 17	153	..
Directors 18 & 19	152	..
Directors 20 - 24	151	..
Directors 25—end	150	..

Spacing from previous element in mm	
Mesh	0
Reflector	60
Driven Element	18.5
Director 1	22
Director 2	16
Director 3	34.5
Director 4	34.5
Director 5	34.5
Director 6	34.5
All remaining Director spacing	69

400

ON WIRING A. P. NASH APRIL '88




IC13a
2400 Hz O/P
+14
C1
100p
16
10
IC1
4060BE
15
X1
1M
R1
11
12
8
TC1
22p
33p
C2
S1
INTERNAL
SYNC
EXTERNAL
SYNC
C3
22n
IC2
4013
12 9 14
11 13
7 8 10
6 7
14
11
12
33K
R3
R2 56K
X1 = 2·4576MHz
HC18U
IC13b
'VIDEO'
FROM
PCB
2
EXT-SYNC I/P (VIA PRE-AMP)
S4
'MAN
STOP'
C8
100n
+5
R10
27K
+14
R11
100K
IC14a
IC14b
C9
4µ7
IC10
567
(300Hz)
TP2
47K
PR1
C18
22µ
TANT
IC16a
C10 2µ2
C17
100n
0V
C11
100n
R12
27K
R13
100K
IC16b
IC13d
IC13
e
R18
1K
'METEO
C12
4µ7
IC11
567
(675Hz)
TP3
22K PR2
C20
22µ
TANT
R17 1K
S7
C19
100n
C13 2µ2
S5
'MAN
288'
'IOC 288'
'IOC 576'
C14
100n
R14
27K
R15
100K
C15
4µ7
IC12
567
(450Hz)
TP4
47K
PR3
C22
22µ
TANT
S6
'MAN
STOP'
C16 2µ2
C21
100n
ALL
DIODES
ARE
IN4148.
ALL RESISTORS
ARE 1/4W
(EXCEPT R9)
100n
0V
R16
220K
+14
+14V
FROM
PCB A8
IC17
470µ
C23
100n
10µ
IC14c
IC13f
IC17 = 78L05
OUT
IN
COM
VIEW FROM
BELOW
IC14d,e,f:

LATE NEWS

On the 15th. June at 04-13 GMT, Ariane successfully launched Meteosat P2 together with Oscar 13 and another satellite. P2 is being transferred to it's geostationary orbit. Commissioning then takes place and P2 should be operational in the next two to three weeks.

Kepler Elements for COSMOS 1602 have just been obtained from Les Currington as follows-

EPOCH OF DATA	88152.507371
ACCELERATION	0.000000244
REV. NO.	19797
INCLINATION	82.538
R. A. NODE	330.131
ECCENTRICITY	0.002341
ARG OF PERIGEE	245.279
MEAN ANOMALY	114.595
MEAN MOTION	14.7385511
SEMI MAJOR AXIS	NOT GIVEN

N B Transmission frequency 137.330 MHZ.

A general comment for some computer programs regarding this last element. The element may need multiplying by 6378.1 to give the answer in kilometres

NOAA "H" has been rescheduled for a launch date of 24 th. September at the earliest. They are having problems with the CPU1 PCB

The Data for Rev No and the Semi Major Axis on page 25 was missing from our information. The Rev No can be calculated from previous Elements. The Semi Major Axis data given in Newsletter No12 is probably accurate enough for normal users.

NOAA '9' PERIOD 102.0686302493566 MINS
INCRM. 25.51509893651412 DEG

1/06 345 14:53	30/06 188 04:27	29/07 336 14:25	28/08 355 15:42
2/06 189 04:29	30/06 341 14:39	30/07 334 14:14	29/08 352 15:31
2/06 342 14:42	1/07 185 04:16	31/07 331 14:03	30/08 349 15:20
3/06 186 04:18	1/07 338 14:28	1/08 353 15:34	31/08 346 15:09
3/06 339 14:31	2/07 182 04:05	2/08 351 15:23	1/09 190 04:46
4/06 184 04:07	2/07 335 14:17	3/08 348 15:12	1/09 344 14:58
4/06 337 14:20	3/07 332 14:06	4/08 345 15:01	2/09 188 04:35
5/06 181 03:56	4/07 355 15:37	5/08 189 04:37	2/09 341 14:47
5/06 334 14:09	5/07 352 15:26	5/08 342 14:50	3/09 185 04:24
6/06 331 13:58	6/07 349 15:15	6/08 186 04:26	3/09 338 14:36
7/06 354 15:29	7/07 347 15:04	6/08 340 14:39	4/09 182 04:12
8/06 351 15:18	8/07 344 14:53	7/08 184 04:15	4/09 335 14:25
9/06 348 15:07	9/07 188 04:29	7/08 337 14:28	5/09 332 14:14
10/06 345 14:56	9/07 341 14:42	8/08 181 04:04	6/09 330 14:03
11/06 190 04:32	10/07 185 04:18	8/08 334 14:17	6/09 355 15:45
11/06 343 14:45	10/07 338 14:31	9/08 331 14:06	7/09 352 15:34
12/06 187 04:21	11/07 182 04:07	10/08 354 15:37	8/09 350 15:23
12/06 340 14:34	11/07 335 14:20	11/08 351 15:26	9/09 347 15:12
13/06 184 04:10	12/07 333 14:09	12/08 348 15:15	10/09 344 15:01
13/06 337 14:23	13/07 330 13:58	13/08 346 15:04	11/09 188 04:37
14/06 181 03:59	13/07 355 15:40	14/08 190 04:40	11/09 341 14:50
14/06 334 14:12	14/07 353 15:29	14/08 343 14:53	12/09 185 04:26
15/06 331 14:00	15/07 350 15:18	15/08 187 04:29	12/09 338 14:39
16/06 354 15:31	16/07 347 15:07	15/08 340 14:42	13/09 183 04:15
17/06 351 15:20	17/07 344 14:55	16/08 184 04:18	13/09 336 14:28
18/06 349 15:09	18/07 188 04:32	16/08 337 14:30	14/09 333 14:17
19/06 346 14:58	18/07 341 14:44	17/08 181 04:07	15/09 330 14:06
20/06 190 04:35	19/07 186 04:21	17/08 334 14:19	16/09 353 15:37
20/06 343 14:47	19/07 339 14:33	18/08 332 14:08	17/09 350 15:26
21/06 187 04:24	20/07 183 04:10	19/08 354 15:39	18/09 347 15:14
21/06 340 14:36	20/07 336 14:22	20/08 352 15:28	19/09 344 15:03
22/06 184 04:13	21/07 333 14:11	21/08 349 15:17	20/09 189 04:40
22/06 337 14:25	22/07 330 14:00	22/08 346 15:06	20/09 342 14:52
23/06 182 04:02	23/07 353 15:31	23/08 190 04:43	21/09 186 04:29
23/06 335 14:14	24/07 350 15:20	23/08 343 14:55	21/09 339 14:41
24/06 332 14:03	25/07 347 15:09	24/08 187 04:32	22/09 183 04:18
25/06 355 15:34	26/07 345 14:58	24/08 340 14:44	22/09 336 14:30
26/06 352 15:23	27/07 189 04:35	25/08 184 04:21	23/09 333 14:19
27/06 349 15:12	27/07 342 14:47	25/08 338 14:33	24/09 330 14:08
28/06 346 15:01	28/07 186 04:24	26/08 182 04:10	25/09 353 15:39
29/06 190 04:38	28/07 339 14:36	26/08 335 14:22	26/09 350 15:28
29/06 343 14:50	29/07 183 04:13	27/08 332 14:11	27/09 348 15:17

All morning passes are southbound, afternoon passes are northbound.

Frequency 137.62MHz. INCRement is degrees change per orbit.

NOAA '10' PERIOD 101.2817734682456 MINS
INCRM. 25.3205634075965 DEG

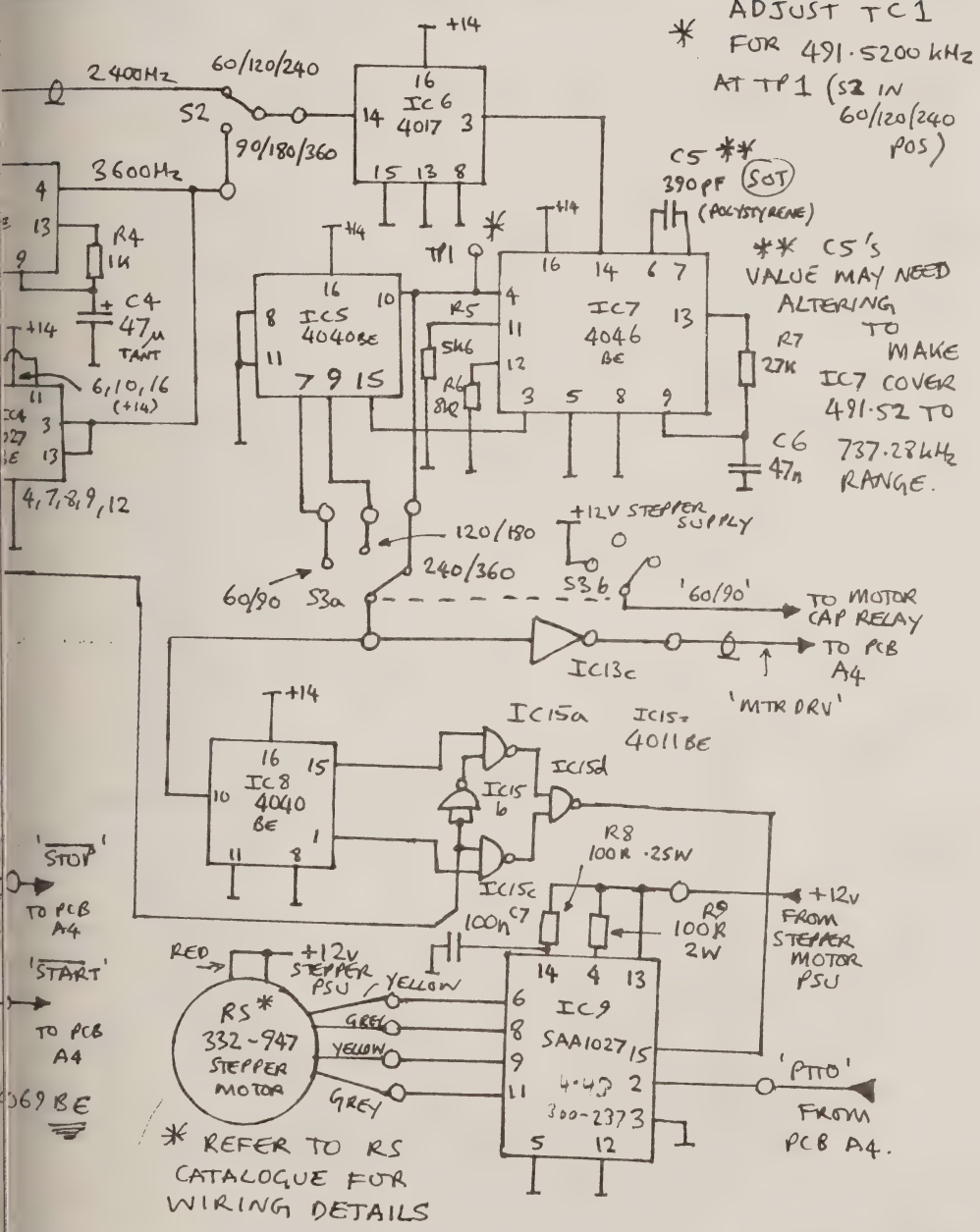
1/06 187 08:05	1/07 173 07:11	31/07 185 07:58	29/08 177 07:27
2/06 181 07:43	1/07 198 08:52	1/08 180 07:36	30/08 172 07:04
3/06 176 07:21	2/07 193 08:30	2/08 174 07:14	30/08 197 08:46
4/06 195 08:40	2/07 345 18:38	2/08 199 08:56	31/08 191 08:24
4/06 347 18:48	3/07 187 08:08	3/08 194 08:34	31/08 343 18:31
5/06 190 08:18	4/07 182 07:46	3/08 346 18:41	1/09 186 08:02
5/06 342 18:26	5/07 176 07:24	4/08 188 08:11	2/09 180 07:40
6/06 184 07:56	6/07 196 08:43	4/08 340 18:19	3/09 175 07:18
7/06 179 07:34	7/07 191 08:21	5/08 183 07:49	4/09 195 08:37
8/06 173 07:12	7/07 343 18:29	6/08 177 07:27	4/09 347 18:44
8/06 199 08:53	8/07 185 07:59	7/08 172 07:05	5/09 189 08:15
9/06 193 08:31	9/07 180 07:37	7/08 197 08:47	5/09 341 18:22
9/06 345 18:39	10/07 174 07:15	8/08 192 08:25	6/09 184 07:53
10/06 188 08:09	11/07 194 08:34	8/08 344 18:32	7/09 178 07:31
10/06 340 18:17	11/07 346 18:42	9/08 186 08:03	8/09 173 07:09
11/06 182 07:47	12/07 188 08:12	10/08 181 07:40	8/09 198 08:50
12/06 177 07:25	12/07 340 18:20	11/08 175 07:18	9/09 192 08:28
13/06 196 08:44	13/07 183 07:50	12/08 195 08:38	9/09 344 18:35
14/06 191 08:22	14/07 177 07:28	12/08 347 18:45	10/09 187 08:06
14/06 343 18:30	15/07 172 07:06	13/08 189 08:16	11/09 181 07:44
15/06 185 08:00	15/07 197 08:47	13/08 341 18:23	12/09 176 07:22
16/06 180 07:38	16/07 192 08:25	14/08 184 07:54	13/09 196 08:41
17/06 174 07:16	16/07 344 18:33	15/08 178 07:31	14/09 190 08:19
18/06 194 08:35	17/07 186 08:03	16/08 173 07:09	14/09 342 18:26
18/06 346 18:43	18/07 181 07:41	16/08 198 08:51	15/09 185 07:57
19/06 189 08:13	19/07 175 07:19	17/08 193 08:29	16/09 179 07:35
19/06 341 18:21	20/07 195 08:38	17/08 345 18:36	17/09 174 07:13
20/06 183 07:51	20/07 347 18:46	18/08 187 08:07	17/09 199 08:54
21/06 178 07:29	21/07 190 08:16	19/08 182 07:45	18/09 193 08:32
22/06 172 07:07	21/07 341 18:24	20/08 176 07:22	18/09 345 18:40
22/06 197 08:48	22/07 184 07:54	21/08 196 08:42	19/09 188 08:10
23/06 192 08:26	23/07 178 07:32	22/08 190 08:20	19/09 340 18:17
23/06 344 18:34	24/07 173 07:10	22/08 342 18:27	20/09 182 07:48
24/06 186 08:04	24/07 198 08:52	23/08 185 07:58	21/09 177 07:26
25/06 181 07:42	25/07 193 08:29	24/08 179 07:36	22/09 197 08:45
26/06 175 07:20	25/07 345 18:37	25/08 174 07:13	23/09 191 08:23
27/06 195 08:39	26/07 187 08:07	25/08 199 08:55	23/09 343 18:31
27/06 347 18:47	27/07 182 07:45	26/08 194 08:33	24/09 186 08:01
28/06 190 08:17	28/07 176 07:23	26/08 346 18:40	25/09 180 07:39
28/06 342 18:25	29/07 196 08:43	27/08 188 08:11	26/09 175 07:17
29/06 184 07:55	30/07 191 08:20	27/08 340 18:18	27/09 195 08:36
30/06 179 07:33	30/07 342 18:28	28/08 183 07:49	27/09 346 18:44

All morning passes are southbound, evening passes are northbound.

Frequency 137.50MHz. INCRement is degrees change per orbit.

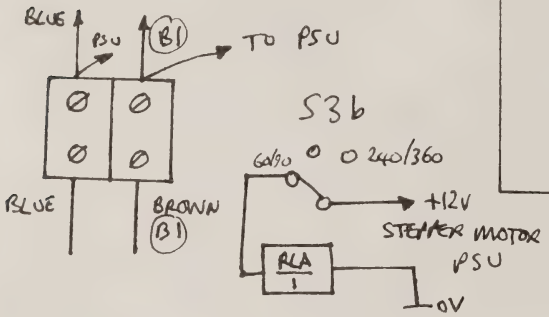
DPTER 400 MODIFICATION PCB 1.

AL CIRCUITS. A·P. NASH APRIL '88



NOTE:

STEPPER MOTOR P.S.U MAINS WIRING:
UNBOLT T/C 400 MAINS TRANSFORMER. LOCATE BLUE WIRE, REMOVING CABLE TIES WHERE NECESSARY. LOCATE BROWN WIRE NO (B1). WIRE AS SHOWN BELOW:



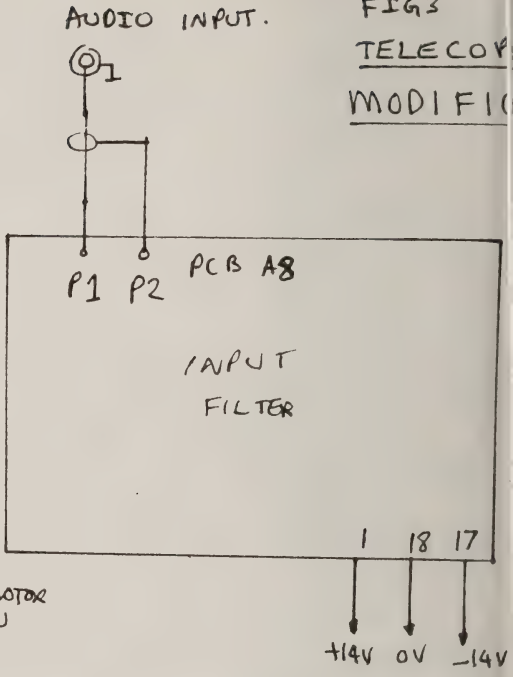
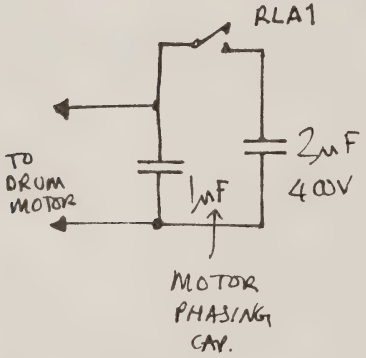
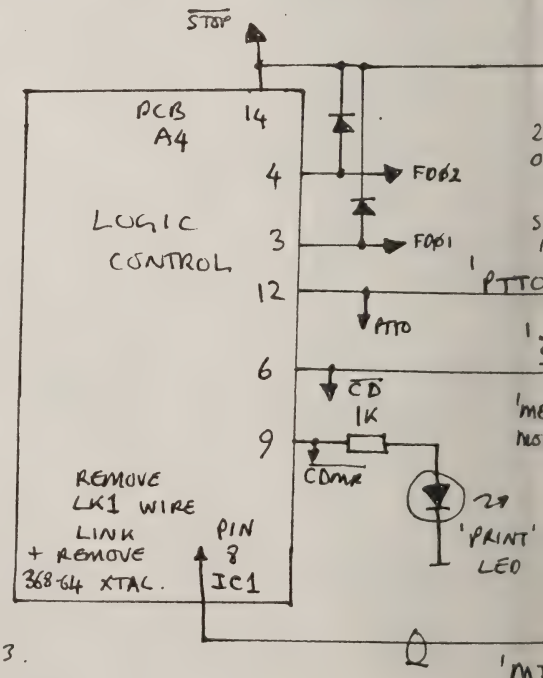
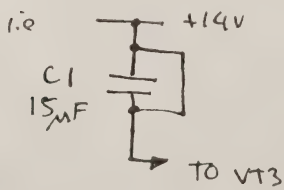


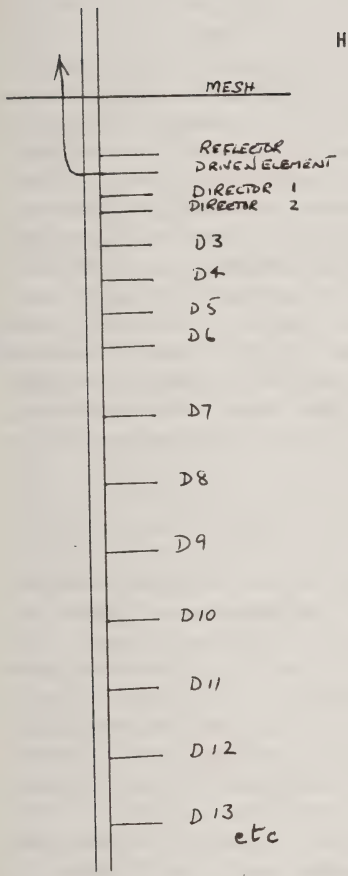
FIG3
TELECOM
MODIFIC

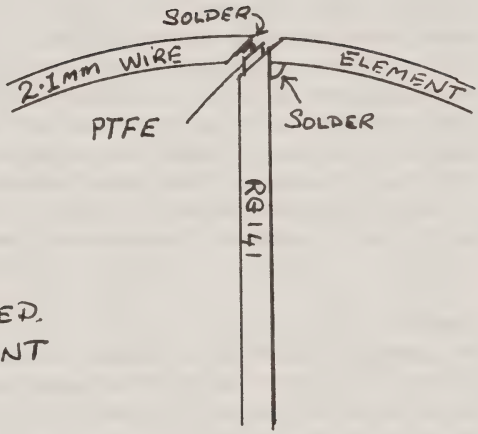


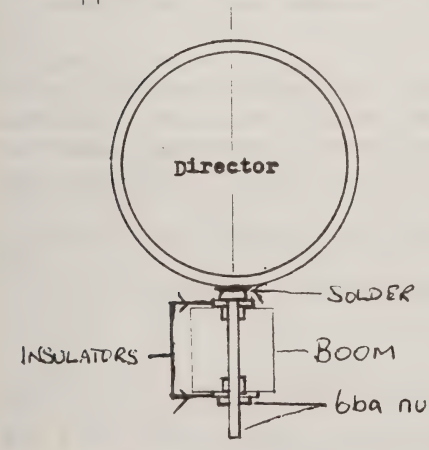


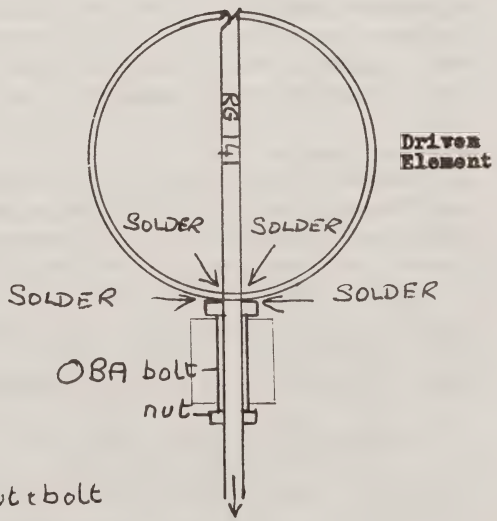
NOTE: BRIDGE C1 ON PCB A3.




MESH
REFLECTOR
DRIVEN ELEMENT
DIRECTOR 1
DIRECTOR 2
D3
D4
D5
D6
D7
D8
D9
D10
D11
D12
D13
etc


SOLDER
2·1mm WIRE
ELEMENT
PTFE
SOLDER
RG141
FEED POINT


Director
SOLDER
INSULATORS
BOOM
6BA nut & bolt


RG141
Driven Element
SOLDER
SOLDER
SOLDER
SOLDER
OBA bolt
nut

INTERFACING APT SIGNALS TO A COMPUTER

by Chris Meadows

Introduction

There are several so called digitizers or interfaces commercially available which process weather satellite automatic picture transmission (APT) signals into a form that a computer can accept and manipulate with suitable software. However there is little documented information describing their current circuit operation or software handling methods. This short article describes a digitizer and its controlling software that has been designed to operate with the BBC micro. Nevertheless the digitizer can be used with any microcomputer with a suitable input/output port by creating new software derived from the flowchart at Figure 5. A typical screen dump of a Meteosat image developed by the system is seen at Figure 1. The picture is part of a whole earth disc image and therefore shows the usefulness of the zoom feature since the area pictured is only a small part of the complete image.

Overview.

The overall sequence of signal processing is shown in block diagram form at Fig 2. At the top left-hand side of the diagram is found the input terminal where the audio APT signal from the receiver or tape recorder is connected. It is first amplified by the OP-AMP section of the IC LM392 to cater for possible low audio input level from a tape recorder. This amplified signal is then passed to a filter, built around one section of a quad BIFET op-amp LF347, which eliminates any 50 Hz hum and reduces the amplitude of any signal frequency above 4kHz.

This output is then input to three separate circuits, a bandpass limiter, an ADC and a comparator, which are now described in turn.

Bandpass Limiter.

A bi-quad active filter, built around the three remaining BIFET amplifiers in the LF347, separates out the 2.4 kHz carrier from the APT signal. this filter circuit was chosen for its dual output; a lowpass and bandpass. The LP output could be used to take advantage of the Meteosat start and stop tones by feeding them to a tone decode circuit. The BP has a bandwidth of about 400 Hz centred on about 2.4 kHz. This output signal is passed to a phase lock loop (PLL) IC before being used for synchronisation in the ADC.

The Analogue to Digital converter

It is here that the APT signal is digitized. An 8 bit-bipolar successive approximation A to D converter is used in the form of the IC, ZN427. It suits the DC voltage available from the BBC micro and is Transistor Transistor Logic (TTL) compatible.

The analogue APT signal must be digitized in step with the 2.4 kHz output from the PLL (IC CD4046). The PLL advances the phase of the carrier by 90 degrees relative to the original 2.4 kHz carrier as to allow correct sampling in the ADC, see Fig. 3. In addition the PLL allows the interface circuit to keep track of tape recorder speed variation when displaying recorded APT signals.

I an sure that many of you will have noticed that 8-bits will provide 256 grey levels and only a maximum of 8 grey scales can be produced in the BBC micro and that in mode 2.

Well this is a BBC B micro limitation. However it does mean that the digitizer could be used with other micros, for example the Atari ST or Archimedes, with suitable software to realise the full capability of this A-D IC. The flowchart at Fig. 5. and its accompanying text provides an algorithm from which a program for any computer may be developed. Its appropriate and convenient to state at this point that the output of the PLL is also used to drive to gates of a quad 2 input NAND Schmitt trigger (74HC132). These two gates generate a square wave which is used to drive a voltage doubler circuit that effectively increases the BBC User Port DC supply of 5v to a range from -2.5v to 5v. Increasing the supply rails to the LF347 and the ADC IC was necessary to avoid clipping of the negative excursions of the analogue signal wave form.
The remaining two NAND gates are used as a gated oscillator to clock the ADC.

The Comparator

Finally the third output drives a comparator, the second part of the LF392 IC. The signal input is compared to a DC level such that when the two are about equal the LED load on the comparator just flickers. This signal level is still dependent on the audio input and so it is easily adjusted by the volume control on the tape recorder. The DC level which is really a DC offset voltage also connects to the ADC. It is also adjustable by a potentiometer so that by judicious setting of this and the tape recorder volume control, optimum image resolution is achieved. The two adjustments tailor the signals amplitude to suit the ADC input voltage range requirement. A DC offset voltage is a negative DC voltage added to the signal to bring the black modulation level down to 0v (remember that the minimum modulation of the APT signal is above 30%). Once correctly set up the 8 logical colours in mode 2 are equally spaced and clear cut, and can be checked by using a recording of test card 4 from Meteosat.

Figs 3 & 4 see page 63

Figure 1 see page 64

ADC Control

It will be most helpful to the reader if Figures 2 and 4 are studied when reading this description of the control signals governing the ADC IC. The Figures show the circuit position and the input and output signal connections to this important circuit element. Conversion is initiated by the negative edge of the start conversion (SC) pulse, obtained from the 2.4 kHz output of the PLL. At this instance the end of conversion (EOC) pin 1 goes low and is made to start the gated oscillator. After 9 pulses conversion is complete, signalled by EOC output going high and inhibiting the clock oscillator. The software monitors the EOC line and the 2.4 kHz output so as to read the ADC's data at the appropriate time.

Software

The program causes the micro to continuously poll the output lines of the digitizer, via the User Port, in such a way to grab the 4 most siginificant bit's (MSB) to give a pixel value. Because of the BBC micro's rather limited resolution, these 4 bits (which are capable of providing (2 to the power 4) = 16 possible grey scale levels) are reduced to three bits (8 levels) in mode 2 and only 2 bits (4 levels) in mode 1.

Flowchart

The flowchart at Fig 5. is a very basic outline of the BBC routine in machine code to capture an image. The user friendly part of the program is in Basic and offers for example choice of display mode or degree of zoom. A simple calculation determines the number of pixels (picture elements) captured and displayed and the number of lines "overplotted" for the correct aspect ratio. These parameters are stored in Page Zero for access by the machine code routine.

The interface is checked for connection to the User Port and for serviceability by looking for the 2.4 kHz clock before continuing with the program. As the images from the satellites are basically either 600 or 1200 pixels per line, the software (for the BBC micro) only plots 300 of these pixels since the highest resolution is 320 pixels per line by 256 lines with 4 colours (320x256x4 grey scales). The odd 20 pixels are ignored. In mode 2 which provides 8 colours but only 160x256 pixels, the software plots 150 pixels.

The BBC micros built in counter is employed to provide a delay until the next line from the satellite is available. Once the machine code routine has been called, keyboard control is lost but can be re-gained by hardware switch on the interface. These switches are read during each end of each line delay period.

Also during this period the opportunity of quitting the capture or restarting is given.

When quit or on completion of an image, control is automatically passed back to the Basic program and an audible tone is given to indicate the fact. There is a further option to start a new capture with new parameters, to quit back to the main menu, or to save the image.

The Read Digitizer Subroutine, called from the main machine code routine carries out the listed functions:-

1. Reads the user port.
2. Test end of convert EOC from the ADC
3. If EOC =0 then step 2.
4. Mask data to 4 bits
5. Store the value in memory (page zero)
6. Repeat processes 1 to 4 according to the satellite, mode and zoom parameters
7. Average pixel values. A necessary procedure to account for type of satellite signal, degree of zoom and display mode selected
8. Convert the luminance values to pixel values for the BBC micro
9. Plot the pixel value.
10. Return.

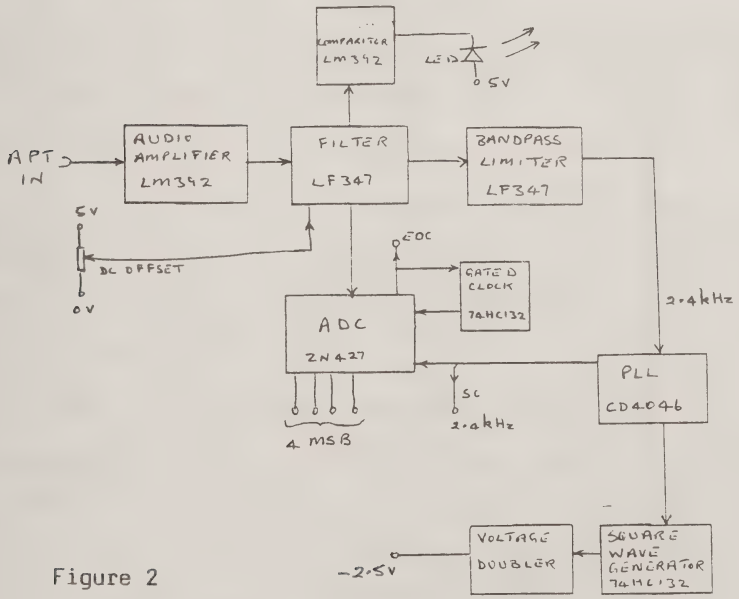


Figure 2

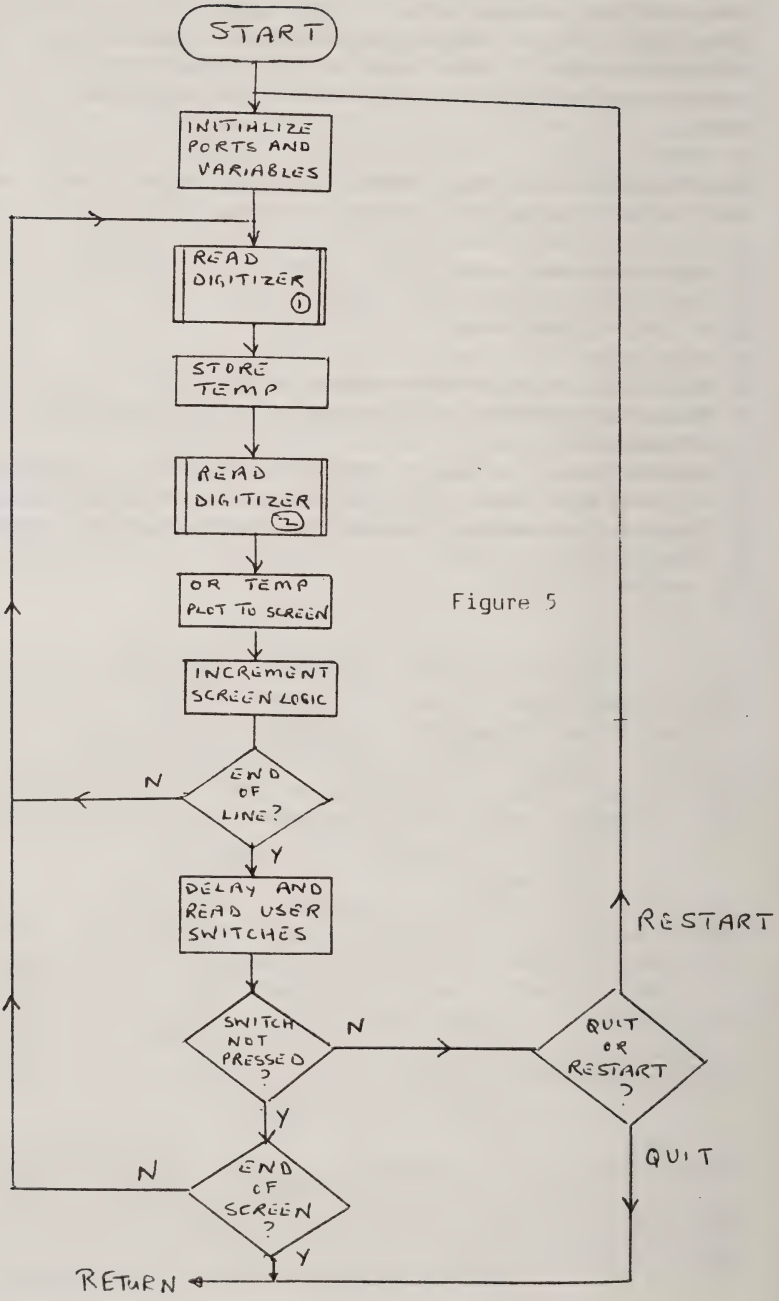

START
INITIALIZE PORTS AND VARIABLES
READ DIGITIZER 1
STORE TEMP
READ DIGITIZER 2
OR TEMP PLOT TO SCREEN
INCREMENT SCREEN LOGIC
END OF LINE?
N
Y
DELAY AND READ USER SWITCHES
SWITCH NOT PRESSED ?
N
Y
END OF SCREEN ?
N
Y
RETURN
QUIT OR RESTART ?
RESTART
QUIT

Figure 5

MEMBERS LETTERS:

Dear Phil,

I can't begin to agree with Henry Neale's last edition in the December Remote Imaging Group Newsletter Number 11 fast enough. Ever since the first NOAA was received on my modified PYE Westminster receiver (bought for #7.50) that pinging noise has rung in my ears. My wife can detect it from well over 20 meters, even with the stereo blaring away... .

So o.k. its now only Meteosat pinging away. In principle Henry has still hit the nail on the head, and I can only endorse his warning to any unsuspecting reader.... Be warned you will start out like the rest of us, just a passing interest in "whats up there", or "lets have a go at receiving some of this data". Next thing you know - 1.8 meter dish in the back garden, Yagi's on the roof, LOK boards fitted in the frame store, evening meals broken off because of that ping ping ping.....

Mean-while-at risk of sending the "stricken" all out side to re-align their dishes "that took so long to position" I wonder how many readers have taken interest in the "LY" Slots on Meteosat secondary user or wefax tranmissions?

These are the re-transmitted American GOES EAST satellite images. The GOES-E satellite is located at 74.5 degrees west of Greenwich Meridian (over Columbia South America) and is one of the primary U.S.A. Meteorological Satellites. The images are of the Eastern Seaboard of the United States down to South America.

The Primary disseminations from the 74.5 degrees west satellite are re-transmitted back up to another satellite at 65 degrees west with all the images in normal WEFAX/APT format for reception by secondary users..... and this satellite at 65 degrees west is well within our view here in the UK. (unless you have something in your way, like for instance a house)
Now I wonder how many readers have re-aligned their dish's and had a look at the relaying satellite at 65 degrees west ?

All WEFAX disseminations are on 1694.5 Mhz (same as Meteosat) and are of similar strength here in the UK., although the position relative to us is only 12 degrees above the horizon. Further more, most of all the disseminations are transmitted through this satellite " AND SOME OF THE POLAR ORBITORS ARE RE-TRANSMITTED " YES yes you can receive some re-transmitted NOAA APT images from over the "POLES"..... at different times of the day.

So now not only will the wife have to endure ping,ping, but no doubt there will be a few hearing the back door slam whilst another addict reaches for his dish and pre-amp.

If anyone is really interested (answers on a postcard to RIG) I could go into a bit more depth on equipment/satellite positions frequencies and possibly get hold of a dissemination copy schedule etc. And or perhaps some information on the Primary service on Meteosat would be an interest to a few?

Bob Sansoni

The editor replies: Yes please Bob, more info ton the primary service and the GOES-E Relay would be very interesting for the menbers.

Dear Phil,

Reader of Dick Boardman's interesting article (newsletter No 12,'computer processing of weather satellite pictures') might be interested in the availability of image processing programs (BBC computer) from Dundee University (Physics Dept)

Regards John Fairweather.

Dear Phil, re DTI LICENSING:

Many thanks for your letter of the 6th of March in response to my membership renewal and questionnaire submission. Would it be possible to include it in a future edition of the newsletter, a few lines of explanation outlining the license situation with regard to satellite reception as distinct from the reception of meteorlogical broadcast transmissions from land based stations!

I am sure many members may not be aware that the Rig licence approval is restricted to satellite reception only and that an additional license is still required for other forms of meteorological data reception.

John Morris G3PHA.

Dear Phil,

Many thanks again for an interesting Newsletter. Greatly appreciated.

Readers may wish to know in the light of Adrians fine article on a VLF Converter, that Omega is hyperbolic lattice time, world-wide radio navigation aid. It continually broadcasts on 10.2kHz, 11.33 kHz and 13.6 kHz from 8 transmitters equally distributed round the earths surface.

The UKs nearest transmitter is at Aldra Norway and uses 10.2 Khz. It is easily heard with a mediocre receiver. Decca's Loran C is similar navigation aid system but broadcasts on frequencies between 90 kHz and 110 kHz. It has a base line of 1000 nautical miles. signals are to easily heard in the U.K on 100 kHz. Because its signal is pulsed it can give interference to those interested in facsimile in this band.

Further in the Fax vein, I have built the VHF Comms (3/85) FM to AM converter and subsequently passed the signals obtained from the FT 1 through the converter to be input to the YU3 frame store. My pictures using this method were disappointing. Very good results however were obtained by using Brid's Fax decoder (see any recent copy of Datacom BARTG) which functions with the BBC micro. His software can take account of the German press (DPA 139.00 kHz) liking from right to left scanning on the frame store causes text, which accompanies the pictures, to appear inside-out and back-to-front. Relayed Meteosat weather pictures on 137.20 kHz are again easily resolved and can be printed with 960 pixels per line on a Epson compatible printer.

Chris Meadows

Dear Philip,

It is always my aim to pick up signals from every APT satellite at least once a week and more usually every few days. The predictions from my computer program are mostly very good since I used the Kepler Elements from UOSAT- 2. That bulletin board unfortunately does not do Cosmos 1766, 1869 or Met 30 however.

In addition I always log every satellite transmission received a habit from my days as a professional satellite controller ! I am therefore passing on the fact that my last contact with Met 2/14 was from the 1957 UT pass on the 14th March, at one degree elevation in the west! subsequently on the 18th of March it was not on for the 1735 UT pass even though I believe it was in sunlight. I have not picked it up since the 14th of March -

- similarly the last picture I got from Met 2/17 was on March 13th at 1123 UT also low in the west. I searched for it on the 19th of March at 1607 UT but in vain. Since then I have not picked it up.

I would add that I have left my equipment on scanning but there has been no change of frequency, and every signal has been positively identified. I passed the information to Adrian (Brixhan) as soon as I was convinced.

I can understand Met 2/14 being switched off since it did have a minor aperture problems but Met 2/17 is on its own frequency and was apparently operating normally. Perhaps it is in hibernation for a new launch using 137.30 MHz ?

Finally I was amazed to see the "stop press" not that Met 30 had" changed" its frequency to 137.02 MHz ! I reported that to RIG as long ago as November 1986 and it was never included in any up date! My own frequency listing sent to RIG was deleted from the article !

Lawrence Harris.

A REVIEW OF THE DARTCOM SATELLITE IMAGE ACQUISITION AND PROCESSING SYSTEM.

Most members of RIG will be familiar with the operation of the famous YU3 UMV frame store and its ability to provide a full 64 grey level resolution from satellite audio signals and many may also have the Dartcom receiver system.

The new system that I saw demonstrated takes satellite image reception and data processing to the limit as far as VHF reception is concerned. It does assume that you already have a Nimbus computer with a minimum of one megabyte RAM available and so I have included references to these prices as well, since at the present time, the software can only run on the Nimbus due to certain hardware limitations.

The complete set-up involves receiving the satellite signals feeding them into the computer and then processing them. If you already have suitable receiving equipment i.e. an antenna and receiver then the system involves the purchase of the computer, acquisition board with software, colour board (optional though surely necessary). So how much you need to spend depends on the equipment you already have. In my case I would need the computer onwards.

Dartcom are basically selling the system minus the computer. This review just covers the acquisition and colour boards plus Dartcom software.

Up to 1984 I had spent years using the most sophisticated image processing software available, using mini-computers and mainframes, involving the use of international satellites collecting data from outer space. The Dartcom software is up to that standard! That is why it costs the price it does.

The total system is able to receive and store the complete picture resolution capability of the satellite. That means every pixel can truly represent the corresponding image measured by the satellite. As a consequence the software memory requirement for the computer is about one megabyte hence the need for the Nimbus and its 16 bit address bus. This is a problem for the PC compatibles which only have an 8 bit bus and can therefore not address the necessary memory. This means that at the moment you must use a Nimbus, sadly adding much to the price.

The acquisition board includes facilities for the later addition of HRPT, FAX and RTTY though you would still need to write or buy software to use these formats so this is perhaps not of special benefit. Its purpose is to take the analogue audio signal from the receiver and to process and digitize it. The conversion rate allows the complete spatial resolution, providing 256 levels for storage and processing. The software that carries out the image processing requires a megabyte of addressable ram.

The software is user friendly with a wide variety of features. You can program the computer to collect specified frames or sequences of frames from Meteosat and this has very exciting possibilities. It can record a sequence of 15 DTOT images (whole disc earth in infra red) and then play them as an animated film, demonstrating the various weather systems. This facility is called "film frame mode" and the software stores a compact file containing each frame of DTOT or what ever you select.

A "mouse" facility is provided to ensure that the full dynamic range is utilised on all satellite transmissions. It is possible to pan and scroll around the picture, and the one demonstrated to me was from NOAA and allowed the discrimination of three cloud levels over Scotland. The resolution of the system can not be surpassed.

There are built in context help messages and an electronic bulletin board which is really a facility allowing text storage with each frame so that special details can be saved for future reference.

A number of printer dump routines are included though you may need an interface for your Nimbus if the printer is fitted with a parallel connector.

A most interesting feature is the 2D and 3D contour diagrams which allow the interpretation of certain types of image eg cloud top heights from Meteosat to be represented in 3 dimensional simulations. I have picked up radar images from the Russian Cosmos satellites and one similar type was displayed in this mode with great effect.

The colour board fits inside the PC and allows a section of 16 colours to be made from a pallete of 4096. To use this effectively you must have a linear RGB monitor available so there goes another #350 or so plus board.

Who is the system designed for? The fact that it can only run properly on a Nimbus means that educational establishment are likely to be the prime users. Few amateurs will be able to afford these machines which is a great pity because both the software and hardware made by Dartcom is excellent.

The Acquisition board cost about #600 and the Colour board about #300 though prices may have changed by the time this review appears. The minimum PC 186 configuration is a 1Mb unit and my costings based on data supplied to me works out to some #1000.00 although again you would have to check this at the time.

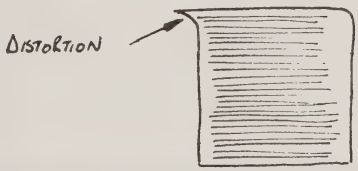
Finally I would add that it is well worth making an effort to see this unit demonstrated because it vividly shows just what can be done with the signals that RIG members are receiving were money no problem. I don't see many members being able to afford it though, which is a pity. I have given in to temptation!

Lawrence Harris.

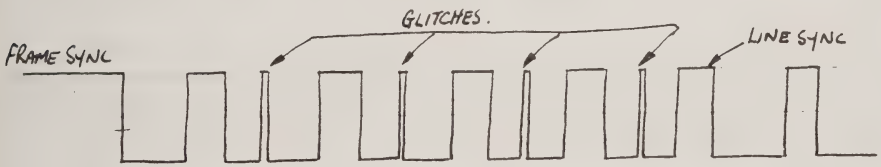
DISTORTION in the YU3UMV framestore
by Ian Gurton, G0CPN

I have always thought that distortion at the top of the picture from my YU3 framestore was due to the monitor I was using, that was until I used another monitor.

This distortion is shown below and is in the first few lines of the picture which normally does not matter except that it distorts the frame identification of Meteosat images.



Examination of the sync pulses with an oscilloscope shows the following waveform at pin 10 of I209:



The narrow pulses between the line sync pulses (just after the frame sync pulse) are the problem, there are also similar glitches in the frame sync pulse. Looking at the inputs on pin 8 and 9 of I209 gives the following waveform for both line and frame.

The positive spikes (shown with arrow) are the problem, additional decoupling of the supply to I209 does not remove these spikes which are due to the RC differentiation circuit feeding these pins (8 and 9)

Changing I209 from a 4011 (quad 2 i/p NAND gate) to a 4093 (quad 2 i/p NAND schmitt trigger) removes the glitches between the line sync pulses so removing the distortion at the top of the picture.

This modification has now been tried on three frame stores with sucesses in each case. If IC sockets are used in the frame store then this mod is very easily done which must make it the simplest mod to the frame store!!.

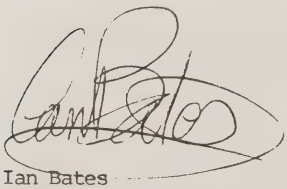
Ian GOCPN.

AUDITORS' REPORT TO THE MEMBERS OF THE REMOTE IMAGING GROUP

I have examined the Income and Expenditure Account for the period ended 31st December, 1987, and Balance Sheet as at that date.

In common with many clubs of similar size and organisation, the financial systems and transactions are controlled by elected Committee Members. I have not been able to verify the completeness of cash receipts nor the valuation of opening or closing stock and have relied upon assurances on these matters from elected Committee Members.

Subject to the above, I consider that the Income and Expenditure Account for the period ended 31st December, 1987, and Balance Sheet as at that date give a true and fair view of the recorded transactions.



Ian Bates
Chartered Accountant
84 Harrow Road,
Leighton Buzzard,
Bedfordshire,
LU7 8UQ.

29th April, 1988.

Dear Sir,

I suppose it was nice while it lasted, even if it did not last very long!

When I first made my weather satellite receiving set up it was a set of printed circuit boards spread out on the bench and it worked beautifully. It consisted of the Dartcom receiver and the YU3UMV field store with modification from the RIG magazine.

So I then took it to bits and rebuilt it, very prettily, in cabinets which took about three weeks. When I fired it all up again there was this strong transmission that made reception pointless. At first I assumed that I had done something wrong of course but upon reading the RIG magazine I had realised that I was merely another unfortunate victim of the profit motive.

I found that if I placed the antenna in the attic instead of up in the clear as it was previously reception again became possible. The range of unusable pictures was reduced to about +/- 1000 miles whereas before it was about twice that but nevertheless that is quite enough to provide considerable interest.

When I sent in the recent questionnaire in the last issue of the magazine that was the situation.

As from about 2 weeks ago another transmitter has come on and that has ended all perceivable possibility of further satellite reception. It matters not what frequency I attempt to receive, when the unwanted transmitter comes on my Dartcom Receiver simply goes completely silent and as it comes on several times per minute much of the time reception of pictures is particularly impossible.

The transmission is on 138.1725 MHz. There is no difficulty in measuring it. A foot of wire in the front of the frequency counter is all that is needed. The signal strength at the bottom of the feeder is 80mV RMS, terminated. How on earth can I cope with that? I don't blame the Dartcom receiver. I should not think that it was ever intended to perform such miracles. If I had known that I was only going to get a few months use out of it though I certainly not have bought it.

When you have a communications company that is obviously in complete disregard of both other users of the spectrum and of the requirements of international law to keep the power to the minimum required for communication this sort of thing is bound to happen I suppose. The best thing that one can hope for is that the company goes bankrupt, then it cannot afford to run the transmitters!

It could be said that I could move operations to reception of Meteosat, but it is only a matter of time before some commercial heavy sits on that as well. And anyway I don't like the pictures. So it looks as if I shall have to mothball the equipment until I retire in 12 years and then try and find somewhere to live out of reach of commercial explorations.

Yours faithfully

A. Jaques G3PTD.

Editors note.
I have spoken to Dartcom concerning Mr. Jaques problems. I assume his problems are with the recently installed paging service transmitters on 138.175 and 138.075. In Mr Jaques case its not clear whether the '3rd' filter mod described elsewhere in this issue has been tried as this would be a good starting point. After that a there is a '4th' filter mod for use in extreme cases of local interference which would have to be installed by Dartcom themselves. So do not give up yet Mr. Jaques, all is not lost!

Notes on centrefold images produced by Colin Hall

NOAA-9 Image 16 May 1988
AOS was 14.35 GMT Orbit No. 17650
Recorded on Muirhead K649 (MUFAX) machine. Modified for switching between independant Infra-red and Visible brightness and contrast controls, per revolution of the Helix, (each line of picture information) The original image (19 inches wide) was copied using PAN F roll film, enlarged and printed on grade 2 paper, in order to reduce its size and enhance the contrast.

PICTURE A
IR and VIS image (IR on Right). This 10 minute portion of the complete 15 min. pass extending from N. Africa coast to Iceland. Storm clouds evident over much of continent, with anticyclone or high pressure system NW of Norway. This produced a cold front which advanced towards Scotland.

PICTURE B Close-up of VIS image above
UK virtually cloud free, with London and Birmingham clearly visible Black line across UK on image due to short but strong interference. These appear at regular intervals and are associated with the recent paging system problems which many RIG members are experiencing on this satellite band. (I have vitually given trying to receive the METS on 137.85 Mhz due to this problem)

Additional filtering for the Dartcom VHF RX.

Introduction

This modification has been designed to give increased I.F.stopband with out degrading the receiver performance both in terms of I.F. bandwidth and overall sensitivity.

The original receiver design used two ceramic 2 pole filters to provide a 50 KHz I.F.bandwidth at 10.7 MHz necessary to receive NOAA and other polar orbiting satellites due to their doppler shift and transmitter frequency deviation.

The advent of paging transmitters running some 100 watts in the previously quiet adjacent band has, as we all know by now caused a few problems!

The modification has been tested on a number of DARTCOM receivers belonging to RIG members with 100% success in all cases. It must be stressed however that the modification may not cure all cases, as it is somewhat dependent on how close you are to the offending paging transmitter.

If you are using any form of active aerial or pre-amplifier then this only makes things worse! It is far better to use good quality coax such as URM67 or RG213 To feed the aerial system direct and remove your pre-amp.

Details of Modifications

The modification consists of adding a further ceramic two pole I.F. filter after the I.F. amplifier and changing one resistor value to 330R from 560R.
The drawing at the end of this article is self explanatory, and the only point of caution is to ensure that the one lead from the new 330R resistor does not short to the centre pin of the new ceramic filter.

Modification Procedure

1. Carefully desolder and remove the 33p capacitor and 560R resistor using a desoldering tool or solder wick.

2. Fit the new 330R resistor as shown in place of the 560R except that its bottom lead now fits into one of the holes previously used for the 33p capacitor.

3. Pre-from the centre common connection of the new filter as shown and then fit the filter into the two remaining holes soldering the centre common connection direct to the top ground plane of the PCB.

This completes the modification. The receiver will now give a typical reaction of >60dB at 137.5 MHz and 137.62 MHz and >50dB at 137.850MHz to a paging transmitter operating on 138.025MHz. This is some 20dB better than the original unmodified receiver.

For really bad cases, it is possible to fit a further filter to provide up to 80dB of rejection. Anyone with such a problem should contact us as a special matching of filter characteristics is required.

Finally all receivers from Ser. No. 198 onwards will already have had this modification done by us as standard. All receivers from Ser. No. 210 onwards have track layout modifications which incorporate this modification together with the facility to add the fourth filter in really bad cases, which should only be done by ourselves.

Parts List.

QTY	DESCRIPTION	SUPPLIER
1	Ceramic filter type SFA10.7FM with red spot code (Murata) Order code	Bonex/Maplin UF71N
1	Resistor carbon or metal film 330R 5% 400mw	

Total cost of parts should be under #2.00.

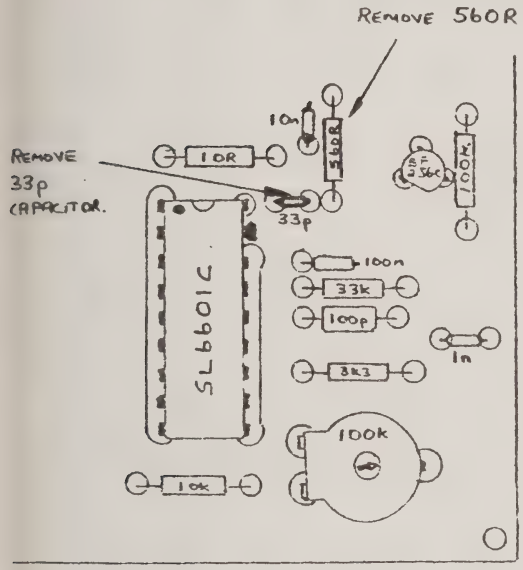
Anyone who feels they cannot manage this modification can return the receiver module to us. We will complete the modification, test the receiver and post it back recorded delivery for #12.00 plus VAT.

Please note that we cannot undertake modifications of any other manufacturers equipment.

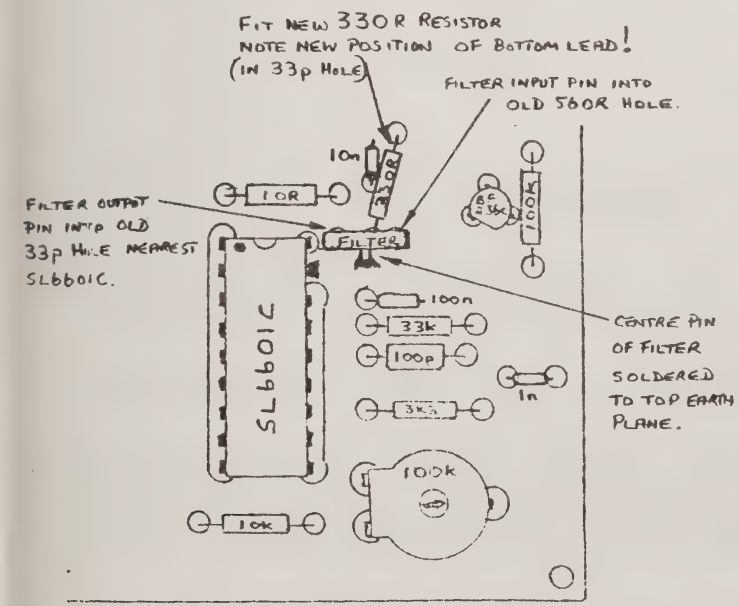
DARTCOM, POSTBRIDGE, YELVERTON, DEVON
PL20 6SY.

Editors note:
Members with other manufacturers receivers which use the SL6601 if/demod chip and who suffer from this type of interference may like to experiment with an additional filter in this position, ie just before the if chip. I would be pleased to print for the benefit of others the results of such experiments.

BOARD LAYOUT BEFORE MODS.



BOARD LAYOUT AFTER MODS.



SFA 10.7MF FILTER DETAILS

KETTERING GROUP TECH MEMO: GP8803

NUMERICAL EDGE CODES OF OCEANOGRAPHIC COSMOS SATELLITES

G E Perry MBE
The Kettering Group

Kettering Group Tech Memo GP8705 reported on a reply from the USSR State Committee for Hydrometeorology and Control of Natural Environment to an inquiry by Dieter Oslender about the interpretation of the numerical edge code on the APT images received from satellites of the Cosmos 1500 type.

S S Khodkin's reply confirmed that the number on line 1, above the gradation wedge (line 2), is the time in minutes after midnight (Moscow Standard Time) and gave explanations for the other ten numbers which follow the gradation wedge. The onboard time is zeroed automatically every 24 hours or by command. The maximum relative error of satellite time is no worse than ± 5 microseconds in the course of every 24 hours. The error between satellite time and SEV time is 0.1 s. The error of the time of resetting to SEV time is 0.1 s. The indicated satellite time (in minutes) corresponds to the moment of transition from the level of the black marking field, located above the onboard time display, to the level of the white field.

Table 3.2 of the State Committee's reply gave the permitted values for the number on line 3, immediately following the gradation wedge, and the Tech Memo gave a BASIC program for generating these values. That program is reproduced here for the reader's convenience.

```
10 X=62                          60 X=X+64
20 FOR M=0 TO 3                  70 NEXT N
30 K=16*M+1                      80 X=X+512:PRINT:PRINT
40 FOR N=K TO K+7                90 NEXT M
50 PRINT X,X+1,
```

It was claimed that by expressing such a value as a 12-bit binary number and selecting the appropriate bits it was possible to determine the status of the onboard instrumentation. It is evident from the values generated by this program that bits 2-6 are always 1s, producing the minimum difference of 62 between pairs of values and that the larger difference between consecutive blocks is due to bit 10. Elimination of bits 2-6 and bit 10 leaves a 6-bit binary number whose bits conform to the pattern provided in Table 3.2 of Khodkin's reply. Further work since the publication of GP8705 has refined the interpretation.

The following BASIC program will display the status of the onboard instrumentation on entering the number on line 3.

```
10 CLS: REM program due to G E Perry, The Kettering Group
20 PRINT"This program presents the status of the onboard instrumentation of oceano
graphic satellites in the Cosmos series":PRINT:PRINT
30 INPUT"Enter number which follows the gradation wedge";X:Z=X: REM convert to 12-
bit binary number, least significant bit first
```

```
40 Y=X/2:IF Y=INT(Y) THEN 60
50 A$="1":GOTO 70
60 A$="0"
70 B$=B$+A$
80 X=INT(Y):IF X=0 THEN 100
90 GOTO 40
100 P=12-LEN(B$):C$="0":IF P=0 THEN 160
110 FOR N=1 TO P-1
120 C$=C$+"0"
130 NEXT
140 B$=B$+C$
150 REM remove bits 2-6 and 10 which are always 1s
160 D$=LEFT$(B$,1):E$=RIGHT$(B$,6):F$=LEFT$(E$,3):G$=RIGHT$(E$,2):H$=D$+F$+G$
170 REM define output strings
180 P$="Primary":BU$="Back-up"
190 O1$=" information display unit is operational"
200 O2$=" VHF radio transmitter is operational"
210 O3$=" UHF radio transmitter is operational"
220 O4$=" MSU-M scanner is operational"
230 O5$=" timer is operational"
240 REM examine bits in sequence
250 IF LEFT$(H$,1)="0" THEN O1$=BU$+O1$ ELSE O1$=P$+O1$
260 IF MID$(H$,2,1)="0" THEN O2$=P$+O2$ ELSE O2$=BU$+O2$
270 IF MID$(H$,3,1)="0" THEN O3$=P$+O3$ ELSE O3$=BU$+O3$
280 IF MID$(H$,4,1)="0" THEN O4$=P$+O4$ ELSE O4$=BU$+O4$
290 IF MID$(H$,5,1)="0" THEN O6$="EA050 operational with signal processing unit
'on'" ELSE O6$="EA151 operational with signal processing unit 'off'"
300 IF RIGHT$(H$,1)="0" THEN O5$=P$+O5$ ELSE O5$=BU$+O5$
310 CLS:PRINT Z:PRINT:PRINT
320 REM display status of onboard instrumentation
330 PRINT O1$
340 PRINT O2$
350 PRINT O3$
360 PRINT O4$
370 PRINT O5$
380 PRINT O6$
390 PRINT:PRINT:PRINT:PRINT
```

The last two numbers on lines 4-12 only are significant. These denote the integer and decimal fraction of the telemetry value in volts to a tolerance of +0.2 V (in code +000.2). Identification of the parameters being monitored and the ranges of permissible values for these lines were listed in the first Table of Khodkin's reply but, without a knowledge of the transfer characteristics, little more than observations of trends will be possible.

Line 4, which may take values from 0010-0055, monitors the switching on of the setting generator (master oscillator).

Line 5 has two possible interpretations. One measures the position of the turning platform of the MSU-M scanner and has values between 0000 and 0063 as specified in Table 3.2 of Khodkin's reply which is reproduced on the next page. The "Ocean Studies" section of *Space Technology Serves Economic Needs* (Novosti, Moscow, 1987) mentions that the

MSU-M scanner is mounted on a turning platform and can deviate depending on the position of the Sun at angles of ± 25° from the vertical with a step of 5°.

Table 3.3 Value of the telemetered parameters of the position of the turning platform EA113 (EA033 I)

	Initial state at nadir	5°	10°	15°	20°	25°
Indicated voltage in V x 0.1 V	0026-0030	0021-0025	0016-0020	backwards 0011-0015	0006-0010	0000-0004(sic)
		0031-0035	0036-0040	forwards 0041-0045	0046-0050	0051-0054

Alternatively, line 5 could be an indication of the temperature inside the EA033 back-up instrument. In that case the range of permissible values would be 0005-0060.

Lines 6 and 8 monitor the operation of the EU2 and EU1 instruments respectively and have permissible values in the range 0035-0055.

Line 7 monitors the operation of either the SPM 3 of the primary EA033 instrument or the SPM 4 of the back-up EA033 instrument with permissible values in the range 0000-0063.

Lines 9 and 10 monitor the output powers of the metric (VHF) and decimetric (UHF) radio transmitters respectively with permissible values between 0015 and 0055.

Line 11 has three possible interpretations. It monitors the operation of either the SPM 1 of the EA050 instrument in the 3NP-5NP dm mode or the SPM 2 of the EA141 instrument in the 6NP dm mode. In either case the range of permissible values is from 0005-0060. Alternatively, line 11 could be analog telemetry of the primary signal processing unit (BOS 1) when the signal processing unit is "on" with permissible values in the range 0000-0040.

The seven possible interpretations of line 12 are listed in sequence as given in Khodkin's reply. The first six have permissible values in the range 0000-0060. They are:

Telemetry of the body temperature of the device near the motor (level 3): EA050 in the 3NP-5NP dm mode or EA141 in the 6NP dm mode;

Telemetry of the presence of input frequency and IOX pulses of the EA050 in the 3NP-5NP dm mode (level 2);

Telemetry of the revolution (rotation) of the scanning element of the EA141 in the 6NP dm mode (level 2);

Telemetry of the operation of the voltage transformer (converter) of the EA050 device in the 3NP-5NP dm mode (level 1);

Telemetry of the operation of the voltage transformer (converter) of the EA141 device in the 6NP dm mode (level 1).

The seventh possibility is analog telemetry of the back-up signal processing unit (BOS 2) when the signal processing unit is "on" with permissible values in the range 0000-0063. (Note that this range differs from that given for BOS 1 in line 11 and it is possible that one or the other is a typographical error.)

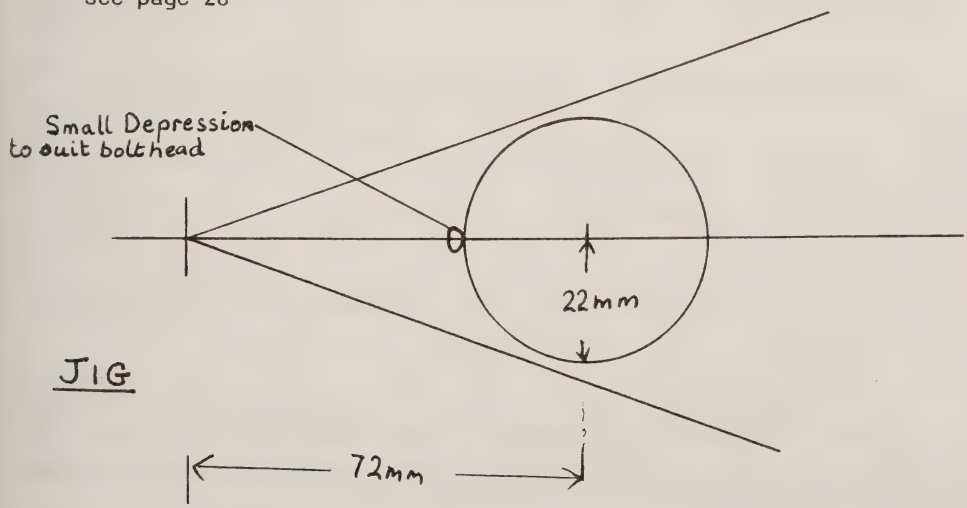
The marking field of colouring the channels of the MSU-M is located after the twelve lines of service information.

I wish to express my grateful thanks to Dieter Oslender for making the original communication from Khodkin available to me and to those friends of the Kettering Group who have provided much assistance with the translation. I would be pleased to receive guidance on the meanings of some terms which have been reproduced as found in the original.

Since completing this study I have been sent a copy of FTD-ID(RS)T-1223-87 of the Foreign Technology Division/USAF Systems Command (3 Nov 87). This is a literal translation of Khodkin's reply and contains at least one typographical error. In general, this is in good agreement with the version produced by the Kettering Group. In one or two instances, where differences occur, the FTD alternative has been given in parentheses following the Kettering version.

J I G Diagram from Henry Neales Quad loop yagi

see page 28



RIG MEMBERS ADVERTISMENTS:

NMI METEOSAT RECEIVER.

The NMI Meteosat receiver is built boxed and tested Meteosat receiver, built from top quality components. The receiver is designed for inside use and gives good results when connected to a 90 cm dish through 10m of H100 cable. The system combines the functions of a downconverter and VHF receiver all in one unit. All that is required is a framestore or similiar device for a complete display system.

Both CH1 and CH2 are available, channel switching is by front panel mounted min. toggle switch, a bi-coloured LED gives visual indication of which channel is being received i.e. red CH1 green CH2 and doubles as power on indicator.

Amplified AFC is used to ensure the receiver is correctly tuned from switch on and throughout use. Audio output is approx 700Mv and is tailored to suit weather satellite transmissions.

The receiver requires a DC power input of between 14 to 20 volts unregulated and the current consumption is approx 170Ma, 5 volts is provided at the aerial socket to power the Maplin aerial and pre-amp system should this be used.

The receiver is housed in a black vinyl covered instrument case (Cirkit DX4) measuring: 300mm Width 167mm Depth 56mm Height.

The receivers are made to order and are priced at #235.00 inclusive of VAT and secricor delivery.

For more information or to arrange a demonstration please phone

Reg Wood G8NMI 0268 767498.

FOR SALE.

As a past member of RIG, I have the following equipment which through circumstances is surplus to requirements and will never be used at this QTH, I wonder if any of your members how would perhaps like a bargain system and would buy it from me.

I have the following items:-

1 Microwave Modules 1690 Down Convertor	#115.00	New cond.
1 LMW 1700 low noise Gasfet preamp (masthead)	#40.00	New cond.
1 Cirkit 137 Mhz RX + 2 Xtals	#30.00	
1 30" dish + splashplate feed system	#15.00	
1 stacked crossed dipoles + switchable masthead amp (137.5 Mhz)	#10.00	
YU3 001 analog board constructed & tested	#13.00	
YU3 002b digital board constructed but not tested (never had power on it)	#13.00	
LOK board constructed & tested	#12.00	

The 1690 convertor and the LMW preamp, have only ever been connected up to confirm reception of Meteosat.

I would prefer to sell as a job lot for around #200.00, but I am willing to haggle if anyone wants to, but if necessary I will split the items up.
They are priced individually above.

Collection for dish aerial to be arranged to post it would cost more than its worth.

Will deliver 20 miles for the whole lot.

John Wright G4DMF.
10, Thorpes Road,
Heanor
Derbys
DE7 7GQ

Phone (0773) 763399 6pm until 9pm + all day Sunday.

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IC22A 2MFM XTALS FOR 21CHANS, TONE BURST, MIC, MOBILE MOUNT, HANDBOOK,BOXED, #75.00 ono

FT290R, HAND BOOK, MOBILE MOUNT, NICADS, CHARGER, CARRYING STRAP, SOFT CASE, MATCHING YAESU FL 2010 10 WATT LINER #235.00. ono.

M.M. 2M/70 CMS VARACTOR TRIPLER #10.00

M.M. 70 CMS/2M RECEIVER CONVERTER #10.00

SOLIDISK 128K OLD STYLE SIDEWAYS RAM BOARD, HANDBOOK, FOR BBC"B" #30.00 ono.

HEWLETT PACKARD SCOPE 185B MAINFRAME, 187 B DUAL TRACE 1GHZ VERTICAL AMPLIFIER, HANDBOOK. #65.00. ono.

BUYER INSPECTS / COLLECTS.

MIKE G8GTP (WHITEFIELD, MANCHESTER) QTHR 061-766 6269

For Sale:

HITACHI 12" Black & White High resolution monitor, ideal for Weather Satellite picture display #50

RIG aluminium petal dish with mount #25

David Jewson, G3XFB Tel 0902 850033

For Sale:

4 foot fibreglass parabolic dish, ex-tv station, #35 ono, Buyer collects

Philips PM8100 ten speed chart recorder in excellent working order #50 Buyer collects.

RX 400 FAX Recorder in excellent working order, plus boxes of paper #40 Buyer Collects.

House move forces sale,
Peter Fleet, G8SYT, QTHR or Tel 0427-616180

REMOTE IMAGING GROUP - Income & Expenditure
Accounts for period 1 April 1987 - 31 Dec 1987

EXPENDITURE

A-D Convertor Mod		934.68
Pre Amp		692.97
Dish		2,786.58
Feed		1,719.16
Mount		180.00
Dartcom Receiver		6,461.49
Dartcom Down Convertor		3,087.00
		15,861.88
Less: Increase in Stock		1,019.95
		14,841.93
Rally Expenses	234.39	
Stand Equipment	154.76	
Committee Expenses	14.38	
Printing (net of stock)	774.87	
Postage	676.22	
Secretarial Services	83.00	
Bank Charges	8.28	
Office Expenses and Equipment	667.75	
Miscellaneous	52.81	
Audit Fee	50.00	2,716.46
		17,558.39
Surplus of Income Over Expenditure		797.45
		£18,355.84

INCOME

A-D Convertor Mod		937.08
Pre Amp		915.10
Dish		2,539.00
Feed		1,373.29
Mount		194.00
Dartcom Receiver		5,885.49
Dartcom Down Convertor		3,216.73
		15,060.69
Subscriptions	2,493.00	
Back Issues	500.50	
Advertising	30.00	
Commission	111.25	
Donations	107.15	
Oscar Locator	5.25	
Miscellaneous	48.00	
		3,295.15
		£18,355.84

BALANCE SHEET AS AT 31st DECEMBER, 1987

Employment of Funds		Funds Employed	
Stock - Newsletters	435.78		
Stock - Equipment	3,440.31	Surplus B/Forward	5,542.56
Cash at Bank	2,511.33	Surplus for Period	797.45
Cash in Hand	2.59		
	6,390.01		
Creditor	50.00		
Net Assets	£6,340.01	Surplus C/Forward	£6,340.01

Peter Charles Brazier
Honorary Treasurer Remote Imaging Group
29th April, 1988.

Phillip Seaford
Secretary Remote Imaging Group
29th April, 1988.

RIG Shop Corner

Meteosat Downconverter - Fully described in RIG 8:-

a). Assembled and tested module in tin plate box:-
#129.69 + #1.00 p&p.

b). Complete mounted in weather proof box:-
#157.96 + #2.00 p&p.
Waterproof power and channel change connector #10.00 extra if required, but note these functions can all be done via the coaxial downlead.

The RIG Receiver module is proving to be very popular with members and is still available from the secretary. The full specification was printed in RIG 5, but briefly the spec. is:

136 - 138 MHz Scanning receiver module
Sensitivity 0.2uV for 12 db SINAD at 10 kHz deviation
IF bandwidth 50 kHz
Audio tailoring specically designed for weather sats.
* NEW * Additional filtering to deal with new paging systems.

Built and aligned PCB together with
LED channel display module, Molex PCB connectors
and optionally, a full frequency LCD readout.

Basic module with channel display	#113.55
as above with additional LCD frequency display	#152.57

Prices includes packing and recorded delivery.
Cheques for above items payable to "DARTCOM".

The RIG VHF preamp also available includes a bandpass filter and is ideal for masthead mounting. The spec. was printed in RIG 7. It is available from the secretary as a built and aligned PCB measuring 85mm by 33mm (3 5/16 x 1 15/16 inches).

Module including first class post #13.37

Other items available by post:

A-D module for complete control of grey levels on the framestore #18.86

Cheques payable to "Remote Imaging Group" please

Anybody requiring PCBs should contact the secretary, G8XTW.

WHERE TO OBTAIN A RIG DISH and FEED HORN:

The RIG has had specially made, some 1 metre spun aluminium dishes and some compatible horn feed assemblies. These are intended to form the basis of an aerial system to receive signals form Meteosat II.

The cost of the dishes and feed horns has been kept to an absolute minimum. So they will not be available by any form of carriage as packing such an item would be impractical. So UK members only, sorry. They are only available to members who may only collect them from the despatch points below or from rallies we attend in the future.

When using the despatch points please use the telephone numbers given to reserve your dish and when collecting please pay by cheque payable to the "Remote Imaging Group".

1 Metre Spun aluminium dish for Meteosat	#34.00
Tubular feed horn with tripod mount for dish above	#33.73

Bedfordshire

The Editor/secretary, see front cover

Oxfordshire

Dermot, G8SIN, Tel. 0865 61797
22 Ramsey Road, Headington, Oxford.

Lincolnshire

Henry, G3REH, Chairman, see front cover

Devon

Dave, G4XOU, Tel 0822 613343
15 Milton Crescent, Down Park, Tavistock, Devon.

Sussex

Des, Membership Sec. Tel. 0273 813103

Manchester

John (J.M.) Horrocks G8GTP, Tel 061 766 6269
"Fairview", 17 Wood Grove, Whitefield, Manchester.

Hertfordshire

Les, G8LOK, see front cover

Birmingham

Colin Hall - see front cover.

L. E. Hornby, 21 West Wools, Portland, Dorset DT5 2EA. Tel: 0305 822753

SPACETECH NEWS

In addition to our range of publications, slides, videos etc., we are now branching out and supporting the **Acorn Archimedes** computer. Our plug-in "Podule" which we hope to launch at the Longleat rally is comparable with most professional systems and the resolution is easily as good as the most sophisticated of framestores around. Look at some specs:

- .Entire NOAA pass in memory,scroll through at leisure.
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- .Animation on Meteosat images.24 frames in memory.(310 Machines)
- .Picture processing utilities: Zoom,edge enhancement, contrast stretching, density slicing, palette control, text etc.etc.
- .Continuous (not just screen) printer dump.
- .Save entire pass to disc.
- .Mouse driven environment etc. etc.

Be prepared to be pleasantly surprised when we announce the price!

	Prices Memb	Non-memb
BOOKS:		
Weather Satellite Reception: Chris Hornby. A guidè to get you started,Aimed at the beginner,but useful reference.	8.75	9.75
Sourcebook of Remote Sensing: A guide to products, utilities etc. V.useful information source for enthusiast	14.25	15.00
Guide to Facsimile Stations: Klingenfuss. A wealth of info not only on FAX but NOAA,Meteosat etc.	12.00	12.00
Guide to Utility Stations: Klingenfuss.For dedicated SWLs	19.00	19.00
Britain from Space: Colour Landsat Atlas of British Isles.	11.95	12.50
Images of the World: Satellite image atlas	12.30	12.95
Images of the Earth: Superb "Glossy".Various satellites.	13.30	13.95
Posters and Teaching Materials. (All posters in colour)		
The Third Planet. Meteosat Whole Disc. 400x600	1.75	1.75
British Isles.Landsat natural colour. 480x710	2.00	2.00
Europe by Satellite.NOAA HRPT. Superb! 590x780	2.50	2.50
London. Landsat colour. Thematic mapper 30m resolution.	4.50	4.95
Satellite Images (1 large,6 small charts +booklet)	4.40	4.60
Satpack 1 & 2:NOAA HRPT images with overlays, interpretation and worked examples.From Royal Met. Society. (per pack)	2.40	2.40

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Videos: All videos £51.75 or £10.00 hire (+£10.00 dep.+£1.00 P&P)
Please phone for current stock..Ideal for winter club night!
Slides: Many available with books and sound cassettes. Please write or phone for latest list before your lecture or presentation.
Equipment: All equipment listed here free P&P.

FAX1: We know it reviewed badly in RIG,but for its application i.e. HF FAX weather maps, the resolution is EXCELLENT. Phone for detailed spec and copy of more favourable review!	269.00	279.95
FAX1 + PSU + Printer (Epson Compatible Copal SC1200)	389.00	399.95
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Single book orders £1.00 P&P. All other orders £2.00 P&P.
Equipment Orders FREE P&P .. Phone or write for latest lists/specs.

Interfacing APT Signals to a computer
Chris Meadows, Figures 3 & 4
see pages 34 - 38

Figure 3 How an analogue signal is sampled

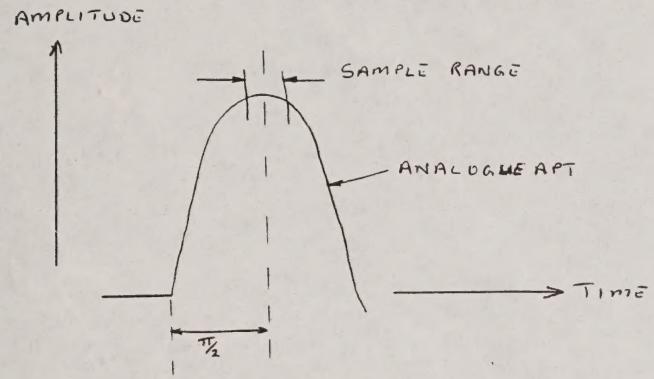

Figure 4 Detailed connections to ADC ic

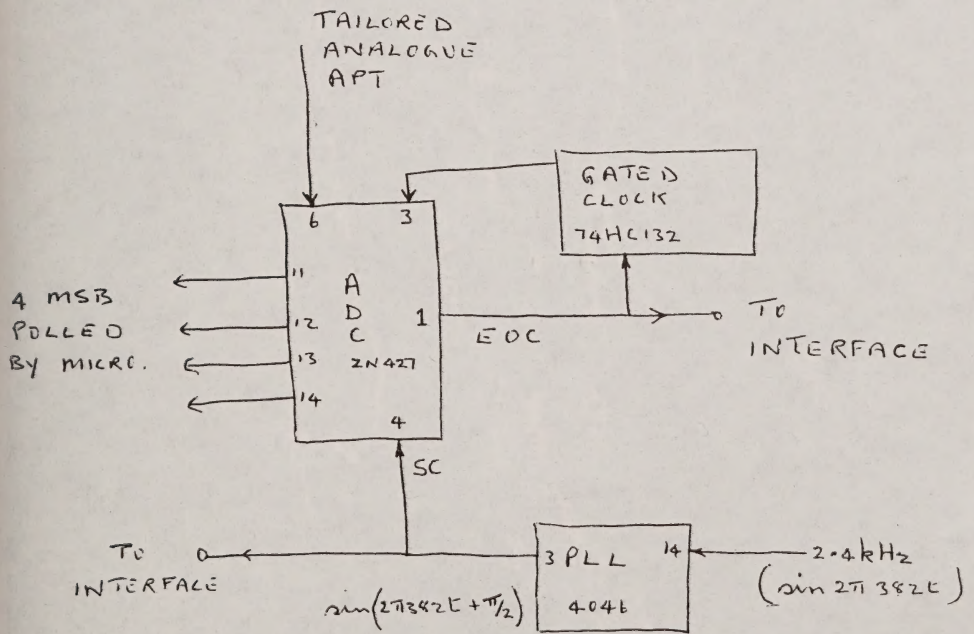

Figure 1 Mode 2 Screen Dump

AVS

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cheques payable to A.V.S.

Weather Satellite Kits & Systems

BBC MICRO-BASED WEATHER STATION
Comprising interface card and WXSAT software package. Used with the MSR20 receiver or similar, gives superb results at a realistic price! Some of the many features include:-

Zoom - X2, X4, X8
Greyscale Control - for visual or I.R.
User-defined colour palette
North/South picture invert facility
Printer dump for hard copies
Fast X-Y picture scrole
WEFAX compatible

The MSS20 can be assembled in an evening, and comes complete with test tape for easy instant alignment!

£3 buys you a demonstration disc of typical pictures (refundable). State 40/80 track.

[The MSS20 system offers really excellent performance, and should not be confused with other BBC-based systems from elsewhere which are no comparison].

£76.47 incl

MSG20 HI-RES FRAME STORE
A 0.5Mbyte dual 512 x 512 frame store with powerful graphics capabilities. Software driven from BBC host micro (modular interface allows alternate host machines later) provides pictures as you've never seen them before. All the usual features like zoom, scroll etc., plus eight-picture capability at 256 x 256 pixel resolution! Due to backlog of orders please allow 28 days delivery.
Some of its many features include:-

* Zoom - x1 to x8
* Window Scrolling (in zoom mode)
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* Up to eight pictures in 256 x 256 mode
* Two pictures in 512 x 512 mode
* Modular design for WEFAX use
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* Contrast stretching/picture enhancement.

Price (built & tested module) £399 incl
DISCOUNT of 15% on all orders before 29/2/88

YU3UMV FRAME STORE KIT
All components to populate the PCBs (which are available from Phil. Seaford).

64k Memory	£68.71 incl.
256k Memory	£78.37 incl.

LOK SYNC BOARD KIT
A complete kit of parts to populate the PCB (available from Phil. Seaford)
£25.85 incl.

MSR20 VHF RECEIVER KIT
A high-performance, dual-conversion design optimized for low noise and high sensitivity. It incorporates audio mute, electronic channel switching, and facilities for the addition of channel scanners and S-meter.
Performance summary:-

RF Bandwidth (3dB)		2.5MHz
IF Bandwidth (3dB)		50KHz
IF Frequencies	(1st)	10.7MHz
	(2nd)	300KHz
Image Rejection Ratio		>100dB
Sensitivity (12dB quieting)		0.15uV
(fully ")		0.6uV
Supply Voltage		12v
Size		133 x 115 mm

The MSR20 is built onto a glass board with printed component overlay, and is accompanied by a comprehensive step-by-step instruction manual with layout and schematic diagrams.
£68.60 incl

MSH20 RECEIVER HARDWARE KIT
A complete kit of parts to case and finish the MSR20. Includes metal case, mains transformer, switches, complete mains lead and IEC input socket, fuse, fuse-holder, knobs, rubber feet, screws, pillars etc.
Kit now also includes mains power supply components.
£36.40 incl

MSA20 CROSSED-DIPOLE VHF AERIAL
A high-quality, well-finished, circular polarized custom-designed aerial. crossed-dipole elements with reflectors.
£24.95 incl.
with built-in preamplifier £39.95 incl.

MSK20 137MHz PREAMPLIFIER
A very low noise MOSFET preamp to give useful signal improvements where aerial-to-receiver runs of more than a few metres exist. The kit comes complete with diecast box and BNC connectors. It takes its power via the coaxial feed, avoiding the need for additional cable runs.
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